Installation, Start-Up and Service Instructions

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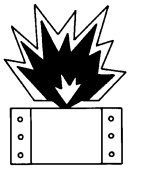
SAFETY CONSIDERATIONS

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair, or service air-conditioning equipment.

Untrained personnel can perform basic maintenance functions of cleaning coils and filters and replacing filters. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may apply.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguishers available for all brazing operations.

⚠ WARNING



Disconnect gas piping from unit when leak testing at pressure greater than ½ psig. Pressures greater than ½ psig will cause gas valve damage resulting in hazardous condition. If gas valve is subjected to pressure greater than ½ psig, it *must* be replaced before use. When pressure testing field-supplied gas piping at pressures of ½ psig or less, a unit connected to such piping must be isolated by manually closing the gas valve(s).

⚠ WARNING

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury.

INSTALLATION

Unit is shipped in the vertical discharge configuration. To convert to horizontal configuration, remove screws from side duct opening covers and remove covers. Using the same screws, install covers on vertical duct openings with the insulation-side down. Seals around duct openings must be tight. See Fig. 1.

Step 1 — Provide Unit Support

ROOF CURB — Assemble and install accessory roof curb in accordance with instructions shipped with curb. See Fig. 2. Install insulation, cant strips, roofing felt, and counter flashing as shown. *Ductwork must be attached to curb.* If gas is to be routed through the curb, attach the accessory thru-the-curb service connection plate to the roof curb in accordance with the accessory installation instructions. Connection plate must be installed before unit is set in roof curb.

IMPORTANT: The gasketing of the unit to the roof curb is critical for a watertight seal. Install gasket supplied with the roof curb as shown in Fig. 2. Improperly applied gasket can also result in air leaks and poor unit performance.

Curb should be level. Unit leveling tolerances are shown in Fig. 3. This is necessary for unit drain to function properly. Refer to Accessory Roof Curb Installation Instructions for additional information as required.

SLAB MOUNT (Horizontal Units Only) — Provide a level concrete slab that extends a minimum of 6 in. beyond unit cabinet. Install a gravel apron in front of condenser coil air inlet to prevent grass and foliage from obstructing airflow.

NOTE: Horizontal units may be installed on a roof curb if required.

Step 2 — Field Fabricate Ductwork — Secure all ducts to roof curb and building structure on vertical units. *Do not connect ductwork to unit.* For horizontal applications, field-supplied flanges should be attached to horizontal discharge openings and all ductwork secured to the flanges. Insulate and weatherproof all external ductwork, joints, and roof openings with counter flashing and mastic in accordance with applicable codes.

Ducts passing through an unconditioned space must be insulated and covered with a vapor barrier.

If a plenum return is used on a vertical unit, the return should be ducted through the roof deck to comply with applicable fire codes.

A minimum clearance is not required around ductwork. Cabinet return-air static shall not exceed −.35 in. wg with Durablade or PARABLADE economizer or .45 in. wg without economizer.

These units are designed for a minimum continuous return-air temperature of 50 F (dry bulb), or an intermittent operation down to 45 F (dry bulb), such as when used with a night set-back thermostat.

Step 3 — Install External Trap for Condensate Drain — The unit's ¾-in. condensate drain connections are located at the bottom and side of the unit. Unit discharge connections do not determine the use of drain connections; either drain connection can be used with vertical or horizontal applications.

When using the standard side drain connection, make sure the plug in the alternate bottom connection is tight before installing the unit.

To use the bottom drain connection for a roof curb installation, relocate the factory-installed plug from the bottom connection to the side connection. See Fig. 4. The piping for the condensate drain and external trap can be completed after the unit is in place.

All units must have an external trap for condensate drainage. Install a trap at least 4-in. deep and protect against freeze-up. See Fig. 5. If drain line is installed downstream from the external trap, pitch the line away from the unit at 1 in. per 10 ft of run. Do not use a pipe size smaller than the unit connection.

Step 4 — Rig and Place Unit — Inspect unit for transportation damage. File any claim with transportation agency. Keep unit upright and do not drop. Spreader bars are not required if top crating is left on unit. Rollers may be used to move unit across a roof. Level by using unit frame as a reference. See Table 1 and Fig. 6 for additional information. Operating weight is shown in Table 1 and Fig. 6.

Lifting holes are provided in base rails as shown in Fig. 6 and 7. Refer to rigging instructions on unit.

⚠ CAUTION

All panels must be in place when rigging.

POSITIONING — Maintain clearance around and above unit to provide minimum distance from combustible materials, proper airflow, and service access. See Fig. 7.

Do not install unit in an indoor location. Do not locate unit air inlets near exhaust vents or other sources of contaminated air.

Be sure that unit is installed so that snow will not block the combustion intake or flue outlet.

Unit may be installed directly on wood flooring or on Class A, B, or C roof-covering material when roof curb is used.

Although unit is weatherproof, guard against water from higher level runoff and overhangs.

Position unit on roof curb so that the following clearances are maintained: ¼-in. clearance between roof curb and base rails on each side and front of unit; 1 5/32-in. clearance between roof curb and rear of unit. (See Fig. 2, section C-C.)

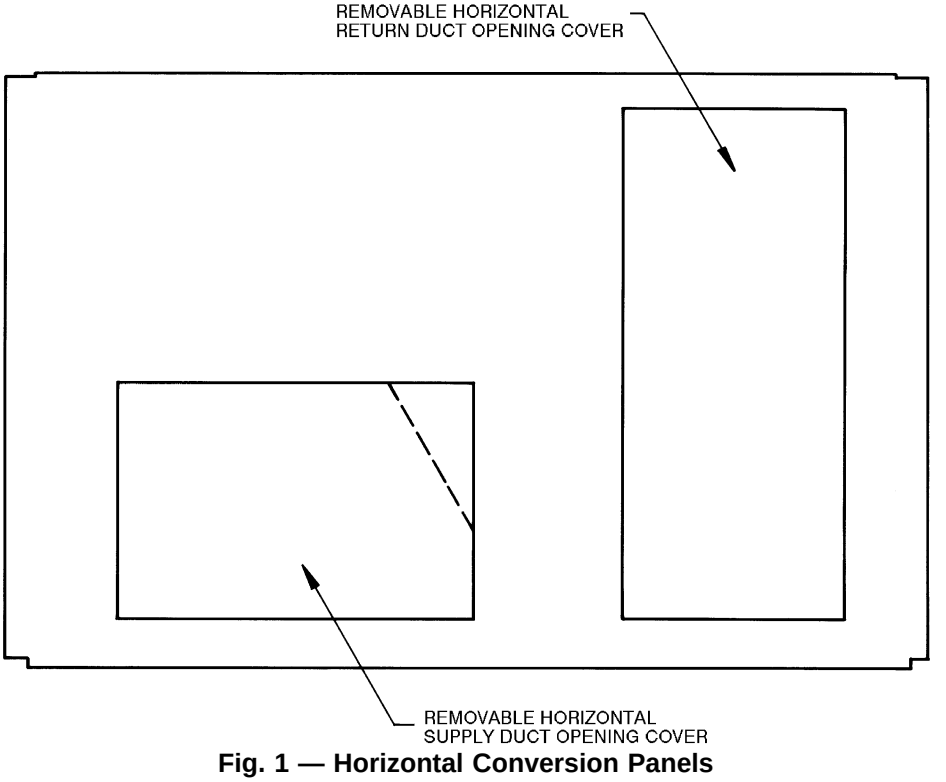


Fig. 1 — Horizontal Conversion Panels

UNIT SIZE 48TJ	"B"	"C"	"D" ALT DRAIN HOLE	"E" GAS	POWER CONNECTION	CONTROL CONNECTION	CONNECTOR ACCESSORY PACKAGE
008-014	2′-8 7/16″ [827]	1′-10 15/16″ [583]	1 3/4″ [45]	3/4″ NPT	3/4″ NPT	1/2 ″ NPT	CRBTMPWR00A100 (THRU-THE-BOTTOM)
				3/4″ NPT	1 1/4″ NPT	1/2″ NPT	CRBTMPWR00A200 (THRU-THE-BOTTOM)

UNIT SIZE 48TJ	"A"	ROOF CURB ACCESSORY
008-014	1′-2″ [356]	CRRFCURB003A00
	2′-0″ [610]	CRRFCURB004A00

NOTES:
1. Roof curb accessory is shipped unassembled.
2. Insulated panels.
3. Dimensions in [ ] are in millimeters.
4. Roof curb: galvanized steel.
5. Attach ductwork to curb (flanges of duct rest on curb).
6. Service clearance 4 ft on each side.
7. Direction of airflow.
8. Either accessory connector package can be used with either roof curb.

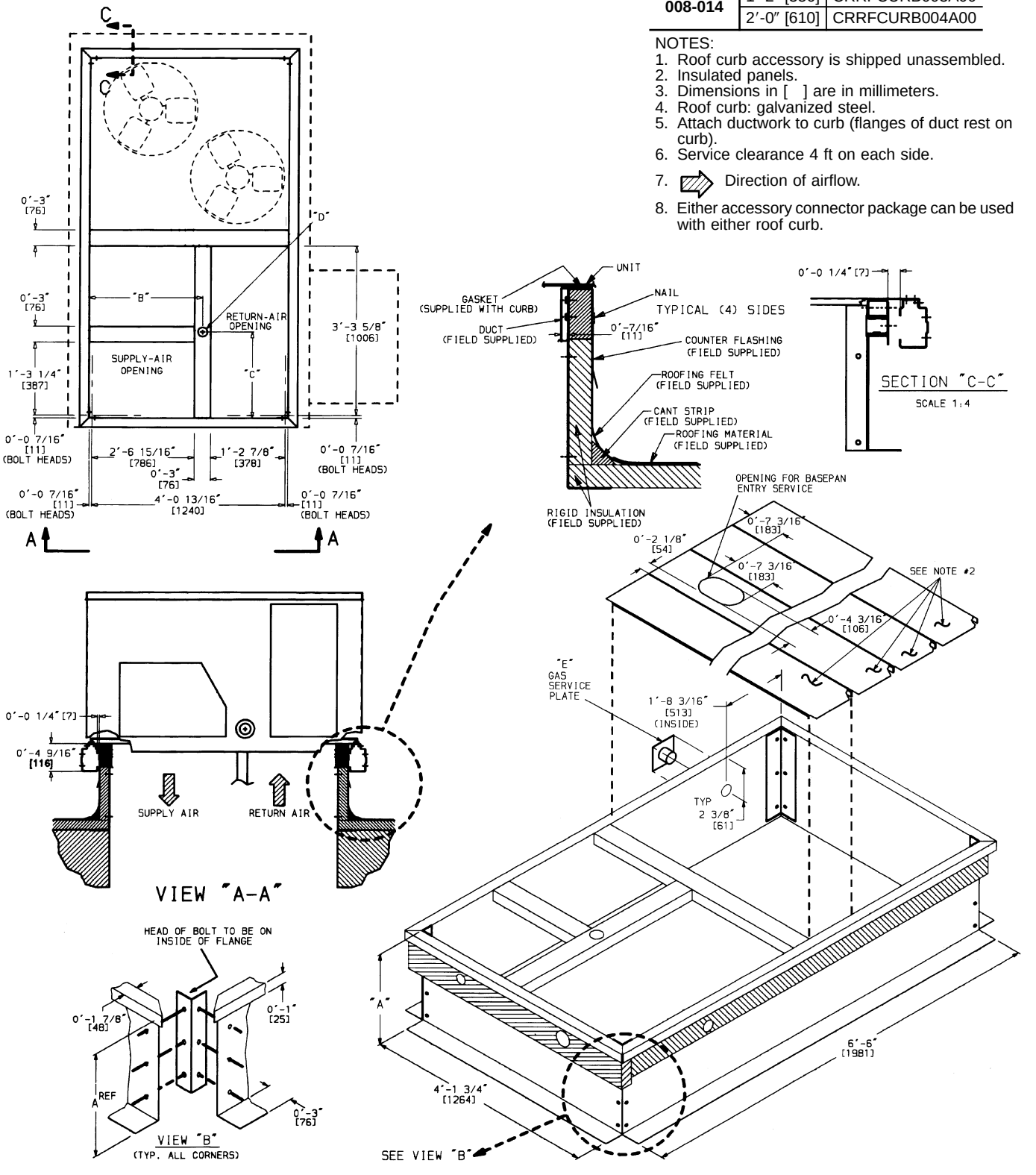
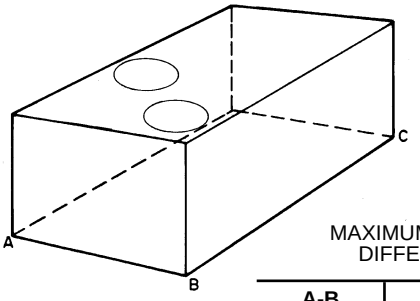


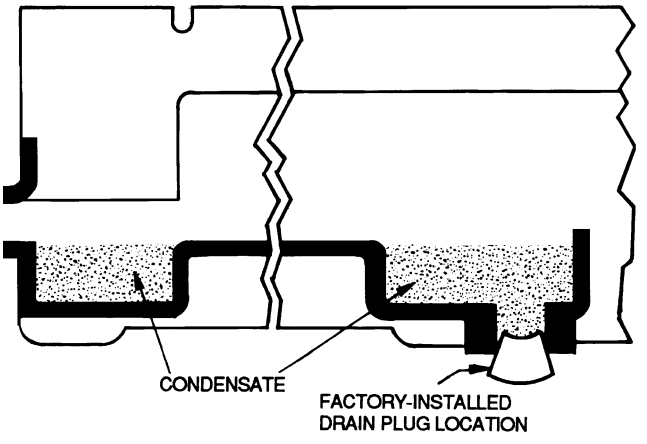
Fig. 2 — Roof Curb Details



MAXIMUM ALLOWABLE DIFFERENCE (in.)

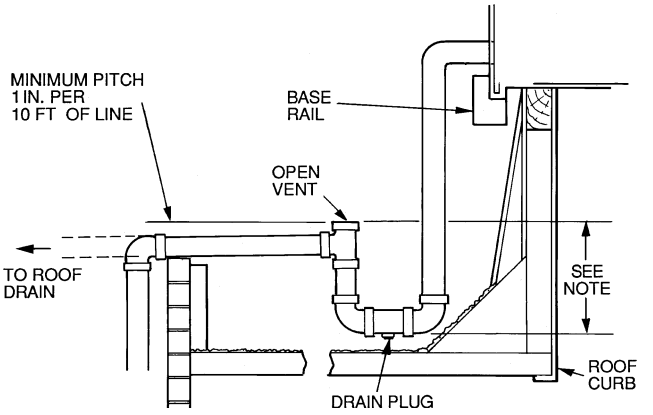
A-B	B-C	A-C
0.5	1.0	1.0

Fig. 3 — Unit Leveling Tolerances



NOTE: Drain plug is shown in factory-installed position.

Fig. 4 — Condensate Drain Pan



NOTE: Trap should be deep enough to offset maximum unit static difference. A 4-in. trap is recommended.

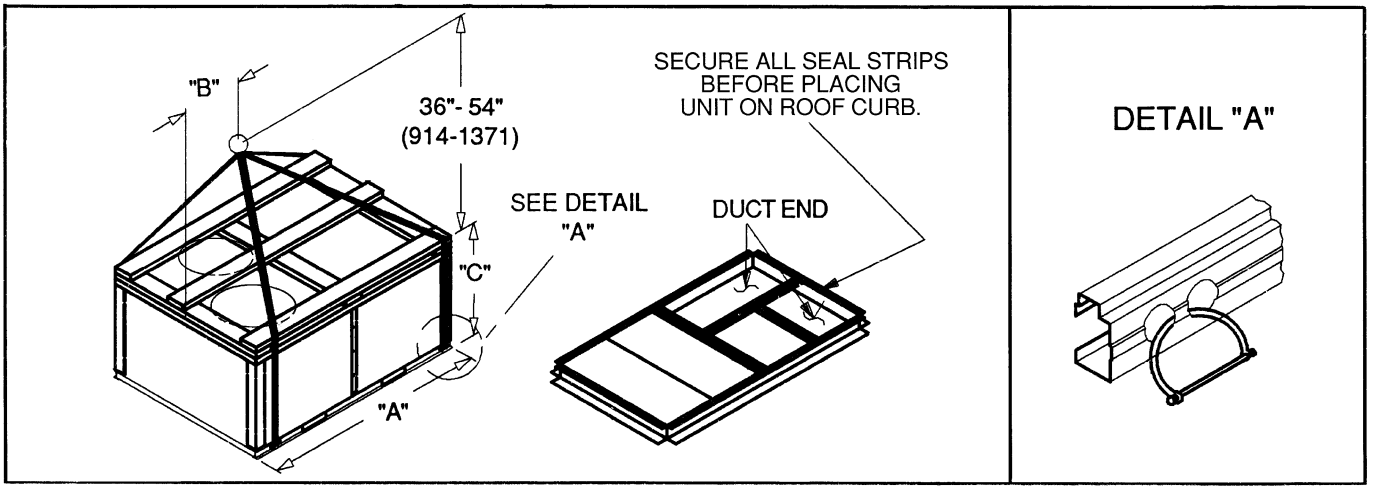
Fig. 5 — External Trap Condensate Drain

Locate mechanical draft system flue assembly at least 48 in. from any opening through which combustion products could enter the building, and at least 48 in. from an adjacent building or combustible material. When unit is located adjacent to public walkways, flue assembly must be at least 7 ft above grade.

Flue vent discharge must have a minimum horizontal clearance of 48 in. from electric and gas meters, gas regulators, and gas relief equipment.

Flue gas can deteriorate building materials. Orient unit so that flue gas will not affect building materials.

Adequate combustion-air space must be provided for proper operation of this equipment. Be sure that installation complies with all local codes and Section 5.3, Air for Combustion and Ventilation, NFGC (National Fuel Gas Code), ANSI (American National Standards Institute) Z223.1-latest year and addendum Z223.1A-latest year. In Canada, installation must be in accordance with the CAN1. B149.1 and CAN1.B149.2 installation codes for gas burning appliances.



NOTES:
1. Dimension in ( ) is in millimeters.
2. Hook rigging shackles through holes in base rail as shown in detail "A." Holes in base rails are centered around the unit center of gravity. Use wooden top skid when rigging to prevent rigging straps from damaging unit.
3. Weights include base unit without economizer. See Table 1 for economizer weights.

⚠ CAUTION

All panels must be in place when rigging.

UNIT	MAX WEIGHT		DIMENSIONS					
			"A"		"B"		"C"	
	lb	kg	in.	mm	in.	mm	in.	mm
48TJD/TJE/TJF008	870	395	87.38	2219	40.25	1022	41.31	1050
48TJD/TJE/TJF009	880	399	87.38	2219	40.25	1022	41.31	1050
48TJD/TJE/TJF012	1035	469	87.38	2219	40.25	1022	49.31	1253
48TJD/TJE014	1050	476	87.38	2219	40.25	1022	49.31	1253

Fig. 6 — Rigging Details

Table 1 — Physical Data

UNIT SIZE 48TJ		008D/E/F	009D/E/F	012D/E/F	014D/E
NOMINAL CAPACITY (tons)		7½	8½	10	12½
OPERATING WEIGHT (lb)					
Unit					
Al/Al*		870	880	1035	1050
Al/Cu*		881	896	1057	1077
Cu/Cu*		893	907	1080	1100
Durablade Economizer		44	44	44	44
PARBLADE Economizer		62	62	62	62
Roof Curb		143	143	143	143
COMPRESSOR		Reciprocating			Scroll
Quantity		2	2	2	2
Oil (oz)		50 ea	50 ea	50 ea	54 ea
REFRIGERANT TYPE		R-22			
Operating Charge (lb-oz)					
Circuit 1		4-13	6-14	5-13	8-10
Circuit 2		4-14	6-3	5-14	8- 6
CONDENSER COIL		Enhanced Copper Tubes, Aluminum Lanced Fins			
Rows...Fins/in.		1...17	2...17	2...17	2...17
Total Face Area (sq ft)		20.50	18.00	17.42	25.00
CONDENSER FAN		Propeller Type			
Nominal Cfm		6500	6500	7000	7000
Quantity...Diameter (in.)		2...22	2...22	2...22	2...22
Motor Hp...Rpm		¼...1100	¼...1100	¼...1100	¼...1100
Watts Input (Total)		600	600	600	600
EVAPORATOR COIL		Enhanced Copper Tubes, Aluminum Double-Wavy Fins, Acutrol™ Feed Device			
Rows...Fins/in.		3...15	3...15	3...15	4...15
Total Face Area (sq ft)		8.0	8.0	10.0	11.1
EVAPORATOR FAN		Centrifugal Type			
Quantity...Size (in.)	**Std**	1...15 x 15	1...15 x 15	1...15 x 15	1...15 x 15
	Alt	1...15 x 15	—	1...15 x 15	1...15 x 15
Type Drive	**Std**	Belt	Belt	Belt	Belt
	Alt	Belt	—	Belt	Belt
Nominal Cfm		3000	3400	4000	5000
Motor Hp	**Std**	—	—	—	—
	Alt	—	—	—	—
Maximum Continuous Bhp	**Std**	2.40	2.40	2.40	4.20
	Alt	—	—	2.90	5.25
Motor Frame Size	**Std**	56	56	56	56
	Alt	—	—	56	56
Nominal Rpm High/Low		—	—	—	—
Fan Rpm Range	**Std**	590-840	685-935	685-935	860-1080
	Alt	685-935	—	835-1085	900-1260
Motor Bearing Type		Ball	Ball	Ball	Ball
Maximum Allowable Rpm		2100	2100	2100	2100
Motor Pulley Pitch Diameter Min/Max (in.)	**Std**	2.4/3.4	2.8/3.8	2.8/3.8	4.0/5.0
	Alt	2.8/3.8	—	3.4/4.4	3.1/4.1
Nominal Motor Shaft Diameter (in.)	**Std**	⅝	⅝	⅝	⅞
	Alt	—	—	⅞	⅞
Fan Pulley Pitch Diameter (in.)	**Std**	7.0	7.0	7.0	8.0
	Alt	7.0	—	7.0	5.9
Nominal Fan Shaft Diameter (in.)		—	—	—	—
Belt, Quantity...Type...Length (in.)	**Std**	1...A...48	1...A...48	1...A...51	1...A...51
	Alt	1...A...51	—	1...A...57	1...BX...46
Pulley Center Line Distance (in.)	**Std**	16.75-19.25	16.75-19.25	15.85-17.50	15.85-17.50
	Alt	16.75-19.25	—	15.85-17.50	15.85-17.50
Speed Change per Full Turn of	**Std**	50	50	50	44
Movable Pulley Flange (rpm)	**Alt**	50	—	50	50
Movable Pulley Maximum Full Turns	**Std**	5	5	5	5
From Closed Position	**Alt**	5	—	5	6
Factory Setting	**Std**	5	5	5	5
	Alt	5	—	5	6
Factory Speed Setting (rpm)	**Std**	590	685	685	860
	Alt	685	—	835	960
Fan Shaft Diameter at Pulley (in.)		1	1	1	1

(See legend and notes on page 6.)

Table 1 — Physical Data (cont)

UNIT SIZE 48TJ		008D/E/F	009D/E/F	012D/E/F	014D/E
FURNACE SECTION					
Rollout Switch Cutout Temp (F)		195	195	195	195
Burner Orifice Diameter (in. ...drill size)					
Natural Gas	**Std**	.120...31	.120...31	.120...31/.120...31/.129...30	.120...31/.129...30
Liquid Propane	**Alt**	.096...41	.096...41	.096...41/.096...41/.102...38	.096...41/.102...38
Pilot Orifice Diameter (Quantity) in. ...drill size					
Natural Gas	**Std**	—	—	—	—
Liquid Propane	**Alt**	—	—	—	—
Thermostat Heat Anticipator Setting (amps)					
208/230 v Stage 1		.14	.14	.14	.14
Stage 2		.20	.20	.20	.20
460 v Stage 1		.14	.14	.14	.14
Stage 2		.20	.20	.20	.20
Gas Input (Btuh) Stage 1		125,000/120,000/180,000	125,000/120,000/180,000	120,000/180,000/200,000	180,000/200,000
Stage 2		—/180,000/224,000	—/180,000/224,000	180,000/224,000/250,000	224,000/250,000
Efficiency (Steady State) (%)		80	80	80	80
Temperature Rise Range		20-50/35-65/45-75	20-50/35-65/45-75	35-65/35-65/40-70	35-65/40-70
Manifold Pressure (in. wg)					
Natural Gas	**Std**	3.5	3.5	3.5	3.5
Liquid Propane	**Alt**	3.5	3.5	3.5	3.5
Gas Valve Quantity		1	1	1	1
Field Gas Connection Size (in.)		½/¾/¾	½/¾/¾	¾/¾/¾	¾/¾
HIGH-PRESSURE SWITCH (psig)†					
Standard Compressor Internal Relief (Differential)		450 ± 50			500 ± 50
Cutout		428			428
Reset (Auto.)		320			320
LOW-PRESSURE SWITCH (psig)†					
Cutout		7 ± 3			
Reset (Auto.)		22 ± 7			
FREEZE PROTECTION THERMOSTAT (F)†					
Opens		30 ± 5			
Closes		45 ± 5			
OUTDOOR-AIR INLET SCREENS		Cleanable			
Quantity...Size (in.)		1...20 x 25 x 1 1...16 x 25 x 1			
RETURN-AIR FILTERS		Throwaway			
Quantity...Size (in.)		4...16 x 20 x 2	4...16 x 20 x 2	4...20 x 20 x 2	4...20 x 20 x 2

LEGEND

Al — Aluminum
Bhp — Brake Horsepower
Cu — Copper

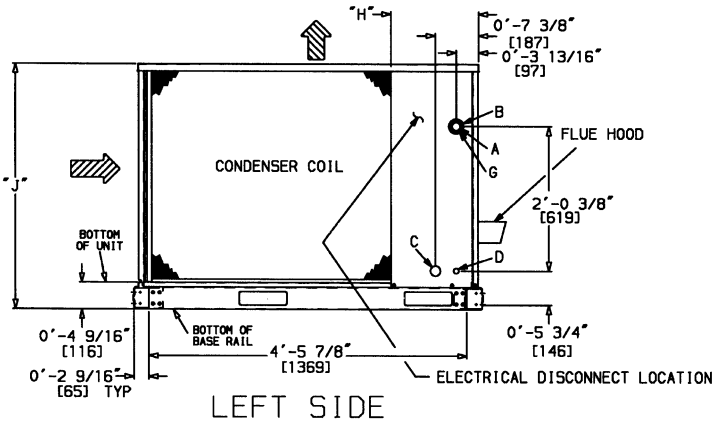
*Evaporator coil fin material/condenser coil fin material.
†Requires an optional or accessory controls kit.

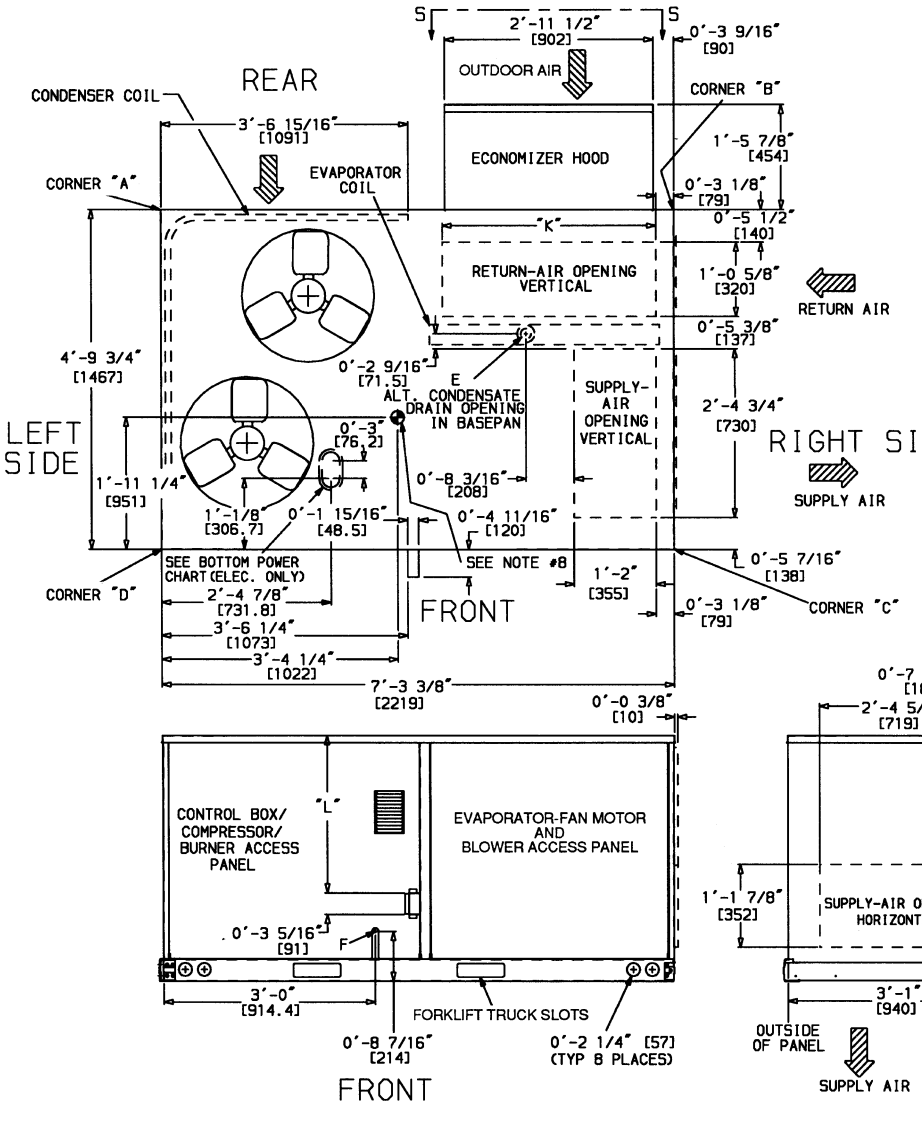
NOTE: The 48TJ008-014 units have a loss-of-charge/low-pressure switch (accessory) located in the liquid line.

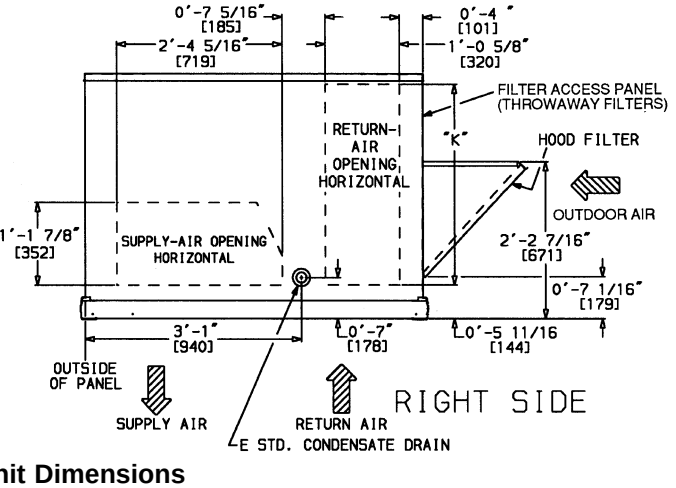
UNIT 48TJ	STANDARD UNIT WEIGHT		CORNER WEIGHT (A)		CORNER WEIGHT (B)		CORNER WEIGHT (C)		CORNER WEIGHT (D)		"H"		"J"		"K"		"L"	
	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm
D/E/F008	870	395	189	86	161	73	239	109	280	127	1-2⅞	378	3-5⁹⁄₁₆	1050	2-9¹¹⁄₁₆	856	2- 2⁷⁄₁₆	672
D/E/F009	880	399	191	87	163	74	242	110	284	129	3-3⅞	1013	3-5⁹⁄₁₆	1050	2-9¹¹⁄₁₆	856	2- 2⁷⁄₁₆	672
D/E/F012	1035	469	225	102	192	87	285	129	333	151	2-5⅞	759	4-1⁹⁄₁₆	1253	3-0⅜	924	2-10⁷⁄₁₆	875
D/E014	1050	476	228	103	195	88	289	131	338	153	1-2⅞	378	4-1⁵⁄₁₆	1253	3-0⅜	924	2-10⁷⁄₁₆	875

	CONNECTION SIZES
A	1⅜″ Dia [35] Field Power Supply Hole
B	2-½″ Dia [64] Power Supply Knock-Out
C	1¾″ Dia [44] Charging Port Hole
D	⅞″ Dia [22] Field Control Wiring Hole
E	¾″—14 NPT Condensate Drain
F	½″—14 NPT Gas Connection 48TJD008 & 009 ¾″—14 NPT Gas Connection 48TJE/F008 & 009; 48TJD/E012,014, 48TJF012
G	2″ Dia [51] Power Supply Knock-Out

NOTES:
1. Dimensions in [ ] are in millimeters.
2. Center of gravity.
3. Direction of airflow.
4. On vertical discharge units, ductwork to be attached to accessory roof curb only. For horizontal discharge units field-supplied flanges should be attached to horizontal discharge openings, and all ductwork should be attached to the flanges.
5. Minimum clearance (local codes or jurisdiction may prevail):
   a. Between unit (flue side) and combustible surfaces, 48 inches.
   b. Bottom of unit to combustible surfaces (when not using curb) 1 inch. Bottom of base rail to combustible surfaces (when not using curb) 0 inches.
   c. Condenser coil, for proper airflow, 36 in. one side, 12 in. the other. The side getting the greater clearance is optional.
   d. Overhead, 60 in. to assure proper condenser fan operation.
   e. Between units, control box side, 42 in. per NEC (National Electrical Code).
   f. Between unit and ungrounded surfaces, control box side, 36 in. per NEC.
   g. Between unit and block or concrete walls and other grounded surfaces, control box side, 42 in. per NEC.
   h. Horizontal supply and return end, 0 inches.
6. With the exception of the clearance for the condenser coil and combustion side as stated in Notes 5a, b, and c, a removable fence or barricade requires no clearance.
7. Units may be installed on combustible floors made from wood or Class A, B, or C roof covering material if set on base rail.
8. The vertical center of gravity is 1′-7″ [483] up from the bottom of the base rail. Horizontal center of gravity is shown.







BOTTOM POWER CHART, THESE HOLES REQUIRED FOR USE WITH ACCESSORY PACKAGES — CRBTMPWR001A00, OR CRBTMPWR002A00

THREADED CONDUIT SIZE	WIRE SIZE	REQUIRED HOLE SIZES (MAX)
½″	24 V	⅞″ [22.2]
¾″	Power*	1⅜″ [28.4]
1¼″	Power*	1¾″ [44.4]

*Select either ¾″ or 1¼″ for power, depending on wire size.

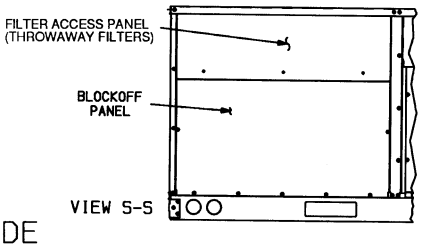


Fig. 7 — Base Unit Dimensions

Step 5 — Install Flue Hood — Flue hood is shipped screwed to the burner compartment access panel. Remove from shipping location and, using screws provided, install flue hood and screen in location shown in Fig. 8.

Step 6 — Install Gas Piping — Unit is equipped for use with type of gas shown on nameplate. Refer to local building codes, or in the absence of local codes, to ANSI Z223.1-latest year and addendum Z223.1A-latest year entitled National Fuel Gas Code. In Canada, installation must be in accordance with the CAN1.B149.1 and CAN1.B149.2 installation codes for gas burning appliances.

For natural gas applications, gas pressure at unit gas connection must not be less than 4.0 in. wg (5.0 in. wg in high heat units) or greater than 13.0 in. wg while unit is operating. For liquid propane applications, the gas pressure must not be less than 5.0 in. wg or greater than 13.0 in. wg at the unit connection.

Size gas supply piping for 0.5 in. wg maximum pressure drop. Do not use supply pipe smaller than unit gas connection.

Support gas piping as shown in the table in Fig. 9. For example, a ¾-in. gas pipe must have one field-fabricated support beam every 8 ft. Therefore, an 18-ft long gas pipe would have a minimum of 2 support beams, and a 48-ft long pipe would have a minimum of 6 support beams.

See Fig. 9 for typical pipe guide and locations of external manual gas shutoff valve.

Step 7 — Make Electrical Connections

⚠ WARNING

Unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of personal injury if an electrical fault should occur. This ground may consist of electrical wire connected to unit ground lug in control compartment, or conduit approved for electrical ground when installed in accordance with NEC (National Electrical Code), ANSI/NFPA (National Fire Protection Association), latest edition, and local electrical codes. *Do not use gas piping as an electrical ground.* Failure to follow this warning could result in the installer being liable for personal injury of others.

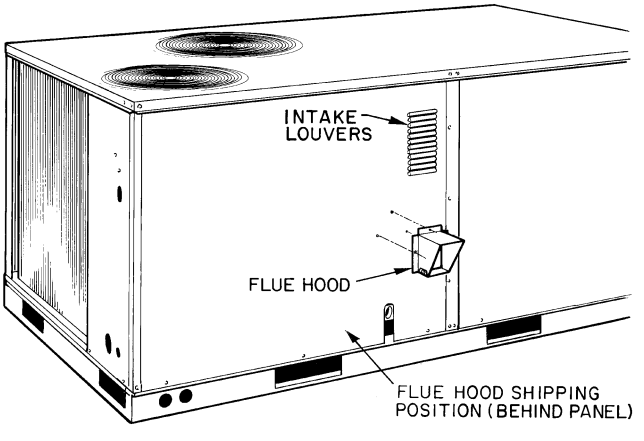
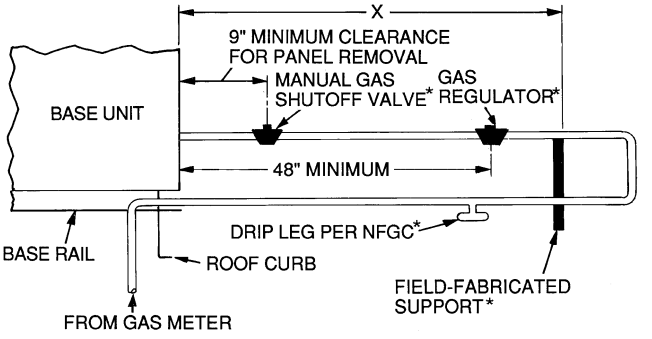


Fig. 8 — Flue Hood Details



LEGEND

NFGC — National Fuel Gas Code
*Field supplied.
NOTE: Follow all local codes.

SPACING OF SUPPORTS

STEEL PIPE NOMINAL DIAMETER (in.)	X DIMENSION (feet)
½	6
¾ or 1	8
1¼ or larger	10

Fig. 9 — Gas Piping Guide (With Accessory Thru-the-Curb Service Connections)

FIELD POWER SUPPLY — All units except 208/230-v units are factory wired for the voltage shown on the nameplate. If the 208/230-v unit is to be connected to a 208-v power supply, the transformer *must* be rewired by moving the black wire from the 230-v red wire on the transformer and connecting it to the 200-v blue wire from the transformer. The red wire then must be insulated.

Refer to unit label diagram for additional information. Pigtails are provided for field service.

When installing units, provide a disconnect per NEC. Use copper conductors only when splice connectors are used.

All field wiring must comply with NEC and local requirements. In Canada, electrical connections must be in accordance with CSA (Canadian Standards Association) C22.1 Canadian Electrical Code Part One.

Install conduit through side panel openings indicated in Fig. 7. Route power lines through connector to terminal connections as shown in Fig. 10.

On 3-phase units, voltages between phases must be balanced within 2% and the current within 10%. Use the formula shown in Table 2, Note 2 to determine the percentage of voltage imbalance. Operation on improper line voltage or excessive phase imbalance constitutes abuse and may cause damage to electrical components. Such operation would invalidate any applicable Carrier warranty.

NOTE: If field-installed thru-the-bottom connections are used, refer to the accessory installation instructions for power wiring. Refer to Fig. 7 for drilling holes in basepan.

FIELD CONTROL WIRING — Install a Carrier-approved accessory thermostat assembly according to installation instructions included with the accessory. Locate thermostat assembly on a solid wall in the conditioned space to sense average temperature in accordance with thermostat installation instructions.

NOTE: For wire runs up to 50 ft, use no. 18 AWG (American Wire Gage) insulated wire (35 C minimum). For 50 to 75 ft, use no. 16 AWG insulated wire (35 C minimum). For over 75 ft, use no. 14 AWG insulated wire (35 C minimum). All wire larger than no. 18 AWG cannot be directly connected to the thermostat and will require a junction box and splice at the thermostat.

Route thermostat cable or equivalent single leads of colored wire from subbase terminals to low-voltage connections on unit (shown in Fig. 11) as described in Steps 1 - 4 below.

1. If unit is mounted on roof curb and accessory thru-the-curb service plate connection is used, route wire through connection plate.
2. Pass control wires through the hole provided on unit (see connection D in Connection Sizes table in Fig. 7).
3. Feed wires through the raceway built into the corner post to the 24-v barrier located on the left side of the control box. See Fig. 12. The raceway provides the UL-required (Underwriters' Laboratories) clearance between high- and low-voltage wiring.
4. Connect thermostat wires to screw terminals on low-voltage connection board.

HEAT ANTICIPATOR SETTINGS — Set heat anticipator settings at .14 amp for the first stage and .20 amp for second-stage heating.

Table 2 — Electrical Data

UNIT 48TJ	NOMINAL VOLTAGE (60 Hz)	IFM TYPE	VOLTAGE RANGE		COMPR (ea)		OFM (ea)		IFM	COMBUSTION FAN MOTOR	POWER SUPPLY		DISCONNECT SIZE*	
			Min	Max	RLA	LRA	Hp	FLA	FLA	FLA	MCA	MOCP†	FLA	LRA
008 (7½ Tons)	208/230 (3 phase)	Std	187	254	13.6	73.4	¼	1.4	5.8	.57	39.2/39.2	45/45	41/41	194/194
	460 (3 phase)	Std	414	508	6.2	37.7	¼	0.8	2.6	.30	18.0	25	19	99
	575 (3 phase)	Std	518	632	4.9	31.0	¼	0.8	2.6	.30	14.2	20	15	81
009 (8½ Tons)	208/230 (3 phase)	Std	187	254	15.8	92.0	¼	1.4	5.8	.57	44.2/44.2	50/50	46/46	231/231
	460 (3 phase)	Std	414	508	7.4	46.0	¼	0.8	2.6	.30	20.7	25	22	116
	575 (3 phase)	Std	518	632	5.9	44.0	¼	0.8	2.6	.30	16.5	20	17	107
012 (10 Tons)	208/230 (3 phase)	Std	187	254	17.9	110.0	¼	1.4	5.8	.57	48.9/48.9	60/60	51/51	267/267
		Alt							7.5		50.6/50.6	60/60	53/53	286/286
	460 (3 phase)	Std	414	508	8.6	55.0	¼	0.8	2.6	.30	23.4	30	24	134
		Alt							3.4		24.2	30	25	173
	575 (3 phase)	Std	518	632	6.4	44.0	¼	0.8	2.6	.30	17.6	20	18	107
		Alt							3.4		18.2	20	19	139
014 (12½ Tons)	208/230 (3 phase)	Std	187	254	23.0	146.0	¼	1.4	10.6	.57	65.2/65.2	80/80	68/68	383/383
		Alt							15.0		69.6/69.6	80/80	73/73	406/406
	460 (3 phase)	Std	414	508	10.4	73.0	¼	0.8	4.8	.30	29.6	35	31	192
		Alt							7.4		32.2	35	34	203
	575 (3 phase)	Std	518	632	8.3	58.4	¼	0.8	4.8	.30	23.6	30	25	154
		Alt							7.4		25.7	35	27	163

LEGEND

FLA — Full Load Amps
HACR — Heating, Air Conditioning and Refrigeration
IFM — Indoor (Evaporator) Fan Motor
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection
NEC — National Electrical Code
OFM — Outdoor (Condenser) Fan Motor
RLA — Rated Load Amps
UL — Underwriters' Laboratories

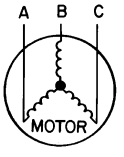
*Used to determine minimum disconnect size per NEC.
†Fuse or HACR circuit breaker.

NOTES:

1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. Canadian units may be fuse or circuit breaker.
2. **Unbalanced 3-Phase Supply Voltage**
   Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percent voltage imbalance.

   $$\% \text{ Voltage Imbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

EXAMPLE: Supply voltage is 460-3-60.



AB = 452 v
BC = 464 v
AC = 455 v

$$\text{Average Voltage} = \frac{452 + 464 + 455}{3} = \frac{1371}{3} = 457$$

NOTE: The 575-v 48TJ008-014 units are UL, Canada, only.

Determine maximum deviation from average voltage.
(AB) 457 - 452 = 5 v
(BC) 464 - 457 = 7 v
(AC) 457 - 455 = 2 v

Maximum deviation is 7 v.

Determine percent voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{7}{457} = 1.53\%$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

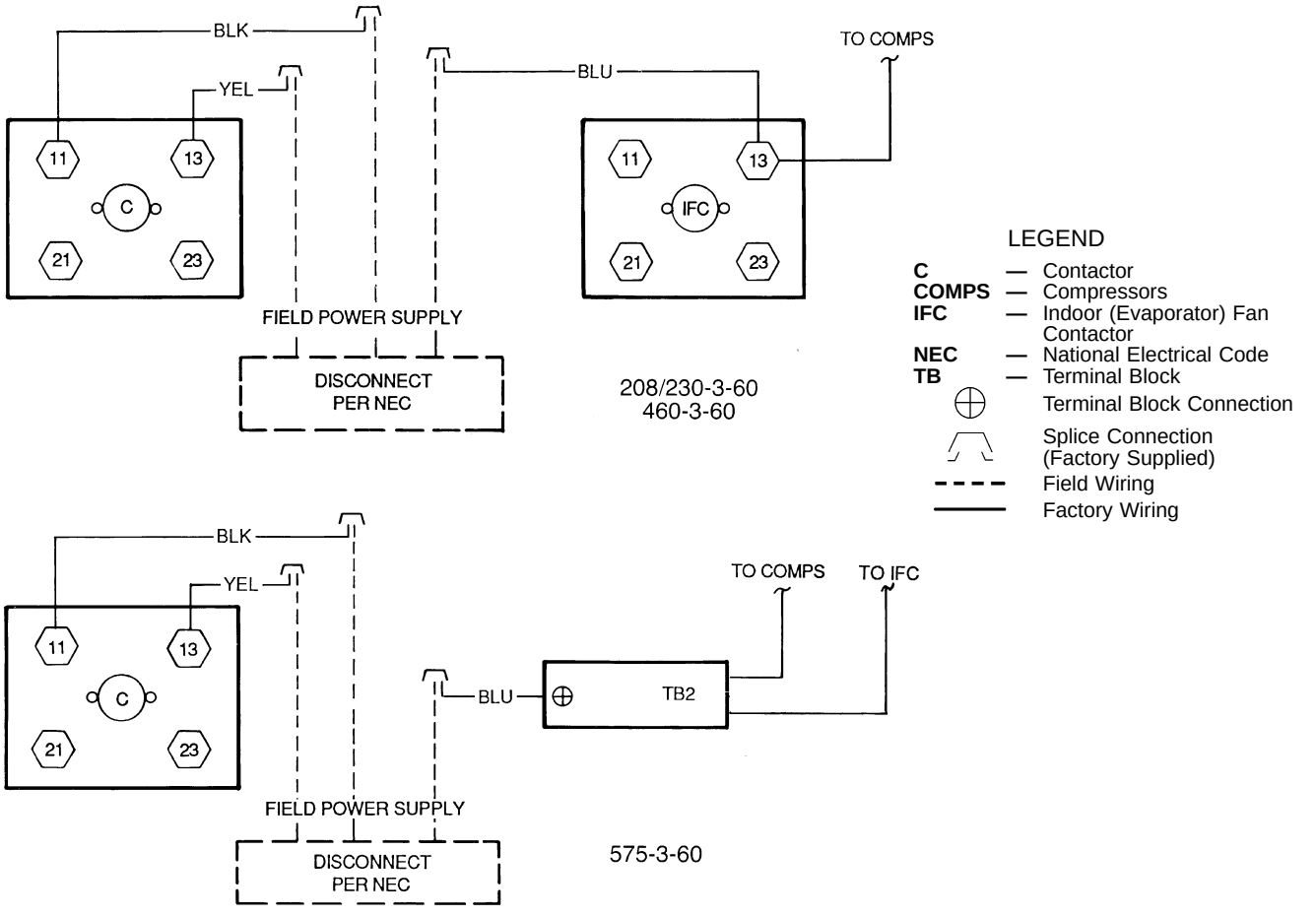
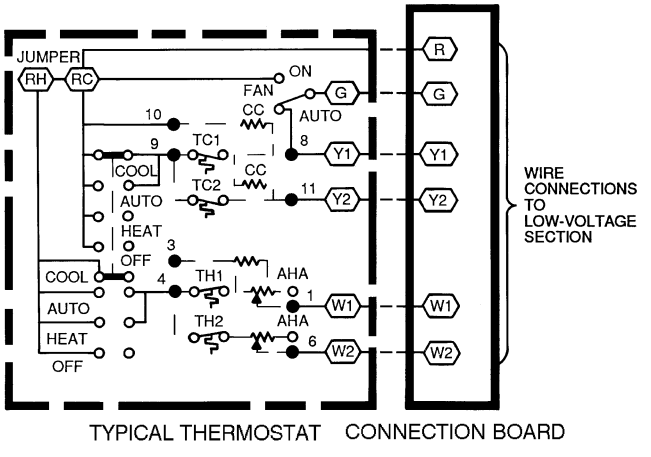


Fig. 10 — Power Wiring Connections



LEGEND

AHA — Adjustable Heat Anticipator
CC — Cooling Compensator
TC — Thermostat-Cooling
TH — Thermostat-Heating
Field Wiring
Factory Wiring

Fig. 11 — Low-Voltage Connections

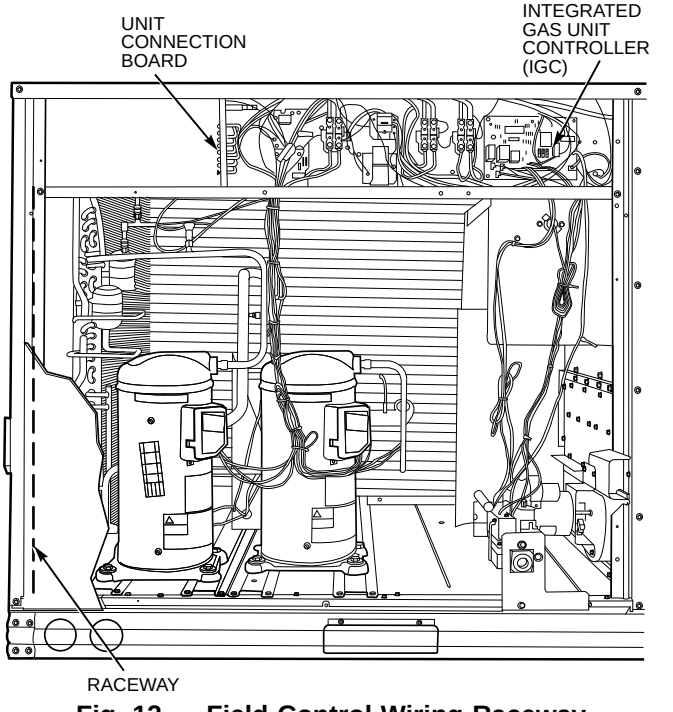


Fig. 12 — Field Control Wiring Raceway

Step 8 — Adjust Factory-Installed Options

APOLLO CONTROL — The optional Apollo control is used to actively monitor all modes of operation as well as indoor (evaporator) fan status, filter status, and indoor-air quality. The Apollo control is designed to work with Carrier TEMP and VVT® systems.

The thermostat must be wired to the Apollo control before starting the unit. Refer to the Apollo control installation instructions for information on installing the thermostat. See Fig. 13 for Apollo location.

MANUAL OUTDOOR-AIR DAMPER — The outdoor-air hood and screen are attached to the basepan at the bottom of the unit for shipping.

Assembly:

1. Determine quantity of ventilation required for building. Record amount for use in Step 8.
2. Remove filter access panel by raising panel and swinging panel outward. Panel is now disengaged from track and can be removed. No tools are required to remove the filter access panel. Remove outdoor-air opening panel. Save panels and screws. See Fig. 14.
3. Separate hood and screen from basepan by removing the screws and brackets securing them. Save all screws and discard brackets.
4. Replace outdoor air opening panel with screws saved from Step 2.
5. Place hood on front of outdoor-air opening panel. See Fig. 15 for hood details. Secure top of hood with the 6 screws removed in Step 3. See Fig. 16.
6. Remove and save 8 screws (4 on each side) from sides of the manual outdoor-air damper.
7. Align screw holes on hood with screw holes on side of manual outdoor-air damper. See Fig. 15 and 16. Secure hood with 8 screws from Step 6.
8. Adjust minimum position setting of the damper blade by adjusting the manual outdoor-air adjustment screws on the front of the damper blade. See Fig. 14. Slide blade vertically until it is in the appropriate position determined by Fig. 17. Tighten screws.

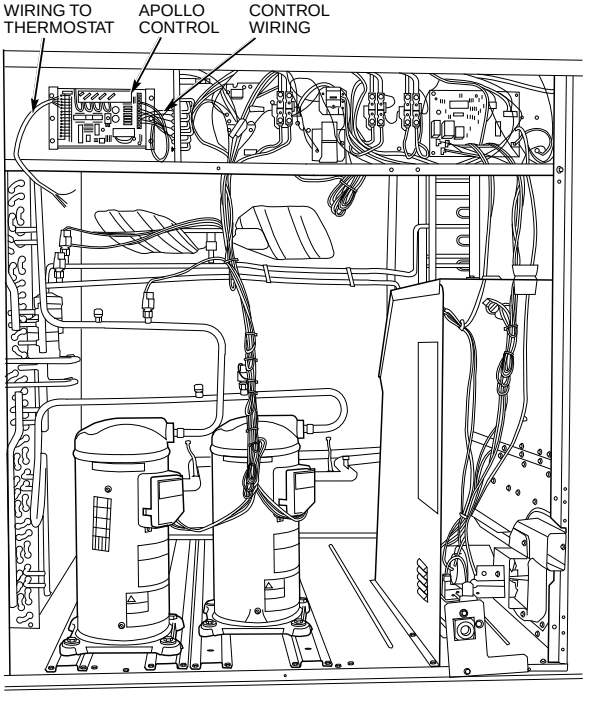


Fig. 13 — Apollo Control Factory-Installed in Typical Unit

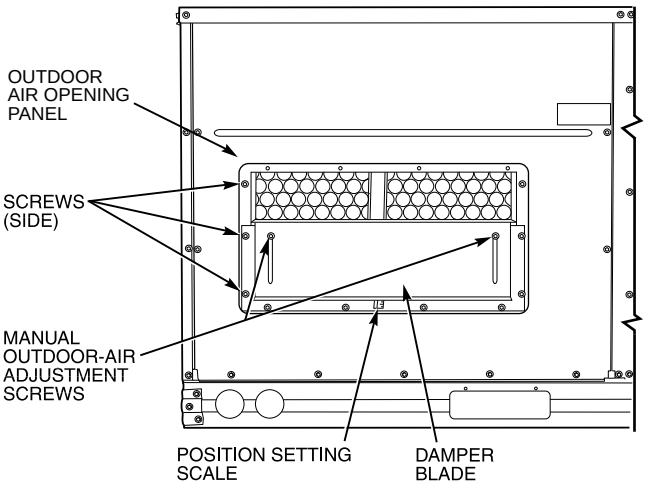


Fig. 14 — Damper Panel with Manual Outdoor-Air Damper Installed

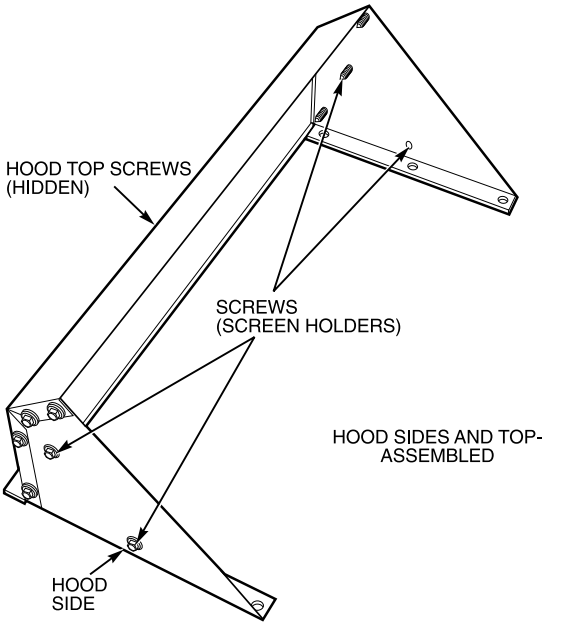


Fig. 15 — Outdoor-Air Hood Details

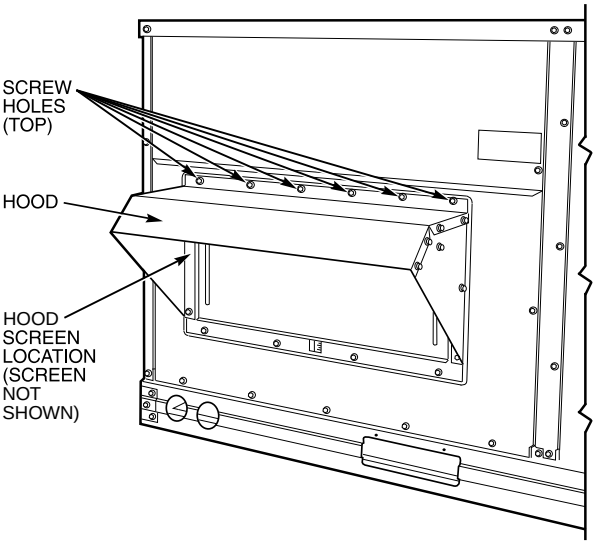


Fig. 16 — Damper with Hood Attached

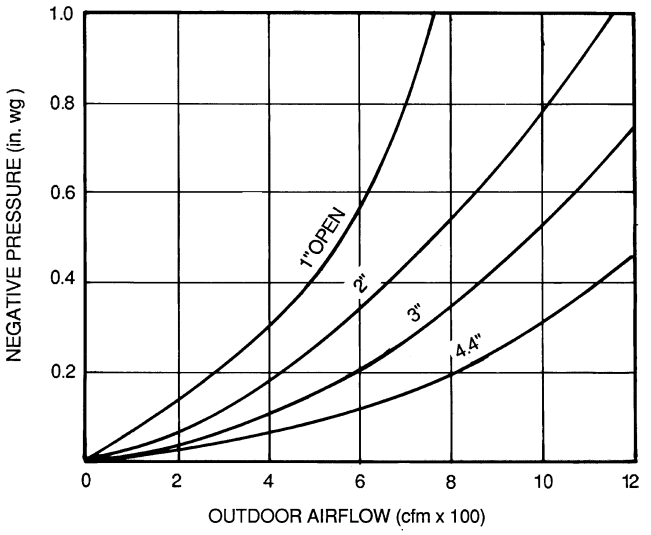


Fig. 17 — Position Setting

9. Remove and save screws currently on sides of hood. Insert screens. Secure screens to hood using the screws. See Fig. 16.
10. Replace filter access panel. Ensure filter access panel slides along the tracks and is securely engaged.

OPTIONAL DURABLADE ECONOMIZER — The optional economizer hood assembly is packaged and shipped in the filter section. Damper blades and control boards are installed at the factory and the economizer is shipped in the vertical discharge position.

NOTE: Horizontal discharge block-off plate is shipped with the air hood package. If unit is to be used for vertical discharge application, discard this plate.

Assembly

1. Determine if ventilation air is required in building. If so, determine the minimum amount to be supplied by each unit and record quantity of ventilation air needed for use in Step 8.
2. Remove filter access panel by raising panel and swinging panel outward. Panel is now disengaged from track and can be removed. No tools are required to remove filter access panel. Remove outdoor-air opening panel. Save panels and screws. See Fig. 18. Remove optional economizer and outdoor-air damper hood package from filter section.
3. Assemble outdoor-air hood top and side plates as shown in Fig. 19. Install seal strips on hood top and sides. Put aside screen retainer and retainer screw for later assembly. *Do not attach hood to unit at this time.*
4. On 012 and 014 units, install vertical discharge block-off plate over duct openings. See Fig. 20.
5. Slide economizer into unit and secure with screws. See Fig. 21.

   NOTE: Be sure to engage rear economizer flange under tabs in vertical return-air opening.
6. To convert to horizontal discharge application:
   a. Rotate the economizer 90 degrees until the economizer motor faces the condenser section (see Fig. 22).
   b. Rotate the barometric relief damper hinge 90 degrees. Barometric relief damper should open vertically to operate properly.
   c. Install horizontal discharge block-off plate over the opening on the access panel. (Block-off plate MUST be installed before installing hood assembly.) See Fig. 23.
7. Insert economizer plug into economizer harness. Remove tape from barometric relief damper. See Fig. 21.
8. If ventilation air is not required, proceed to Step 9. If ventilation air is required, determine the minimum position setting for required airflow. See Fig. 24. Adjust minimum position setting by adjusting the screws on the position setting bracket. See Fig. 25. Slide bracket until the top screw is in the position determined by Fig. 24. Tighten screws.
9. Remove tape from outdoor-air thermostat (OAT). Fasten OAT to inside of hood using screws and speed clips provided. See Fig. 26. Make sure OAT terminals are positioned up.
10. Replace outdoor-air opening panel using screws from Step 2. Replace filter access panel. Ensure the filter access panel slides along the tracks and is securely engaged.
11. Fasten hood top and side plate assembly to outdoor-air opening panel with screws provided.
12. Place knob supplied with economizer on OAT. See Fig. 26. Set for 3° F below indoor room thermostat setting. If accessory enthalpy control (EC) is used in place of OAT, see instructions shipped with EC for installation and adjustment. See Fig. 26.
13. Connect OAT per Fig. 27.
14. Slide outdoor-air inlet screens into screen track on hood side plate. While holding screens in place, fasten screen retainer to hood using screws provided.

NOTE: Refer to Fig. 28 for Durablade economizer barometric relief damper characteristics.

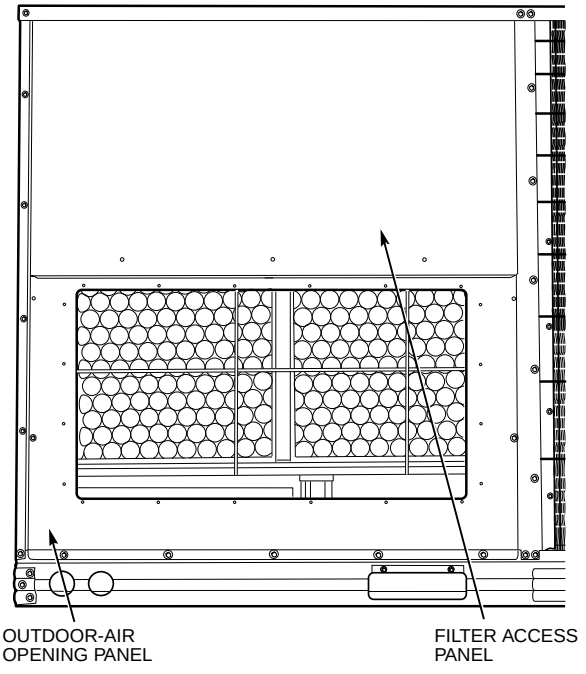


Fig. 18 — Access Panel Locations

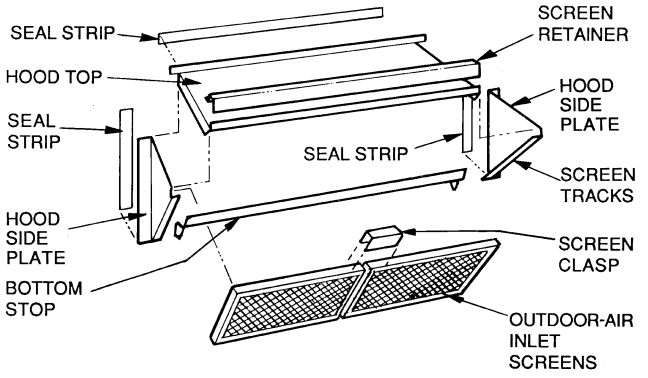


Fig. 19 — Outdoor-Air Hood Details

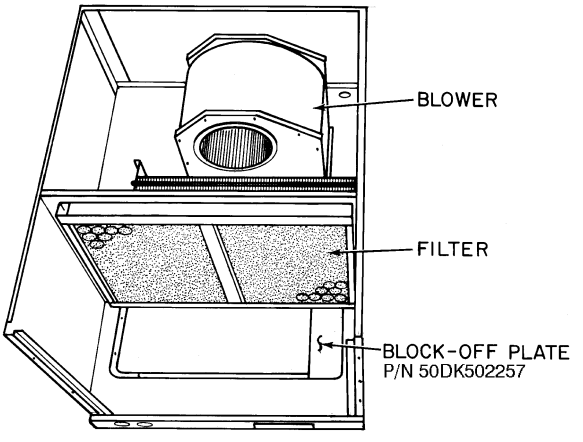


Fig. 20 — Vertical Discharge Block-Off Plate (Sizes 120,150 only)

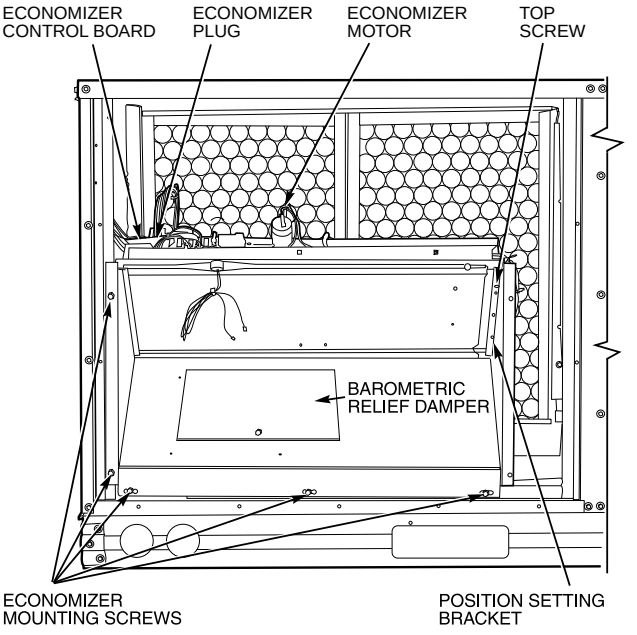


Fig. 21 — Durablade Economizer Installed in Unit

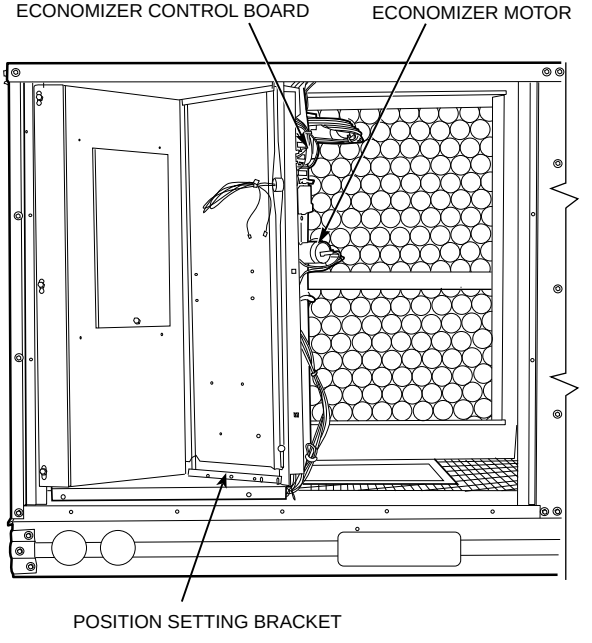


Fig. 22 — Horizontal Durablade Economizer Installation (90 Degree Rotation)

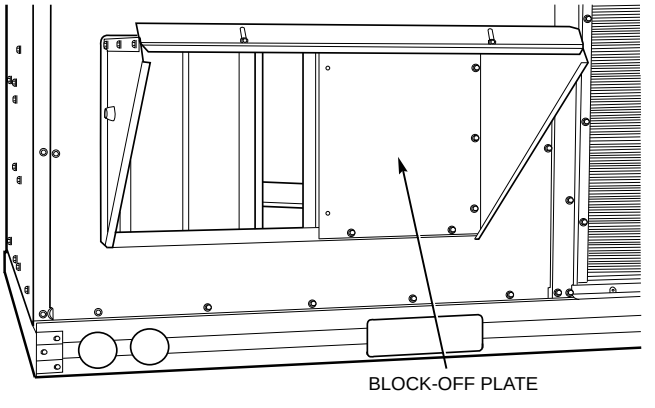
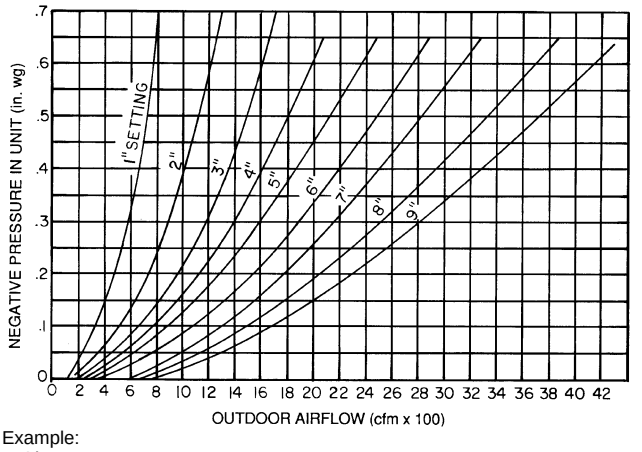


Fig. 23 — Horizontal Discharge Block-Off Plate



Example:

Given —

Negative Pressure . . . . . 0.1 in. wg

Outdoor Airflow . . . . . 1100 cfm

Determine —

Setting = 6″

Fig. 24 — Durablade Economizer Damper Minimum Position Setting

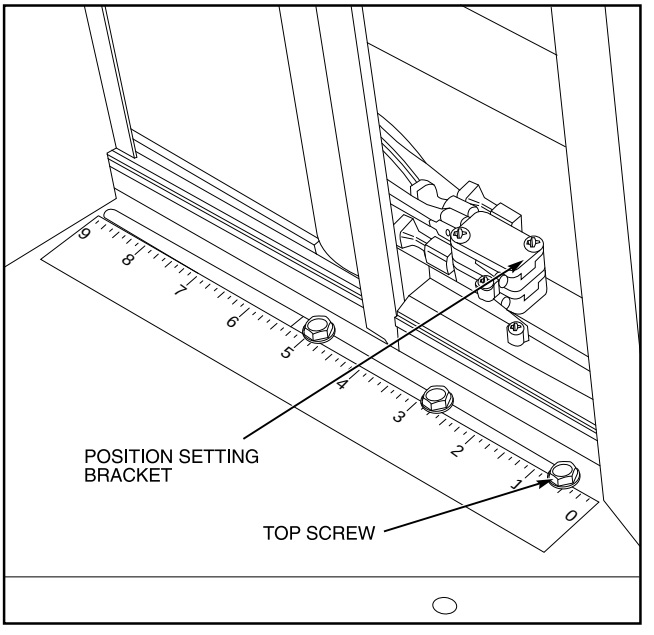
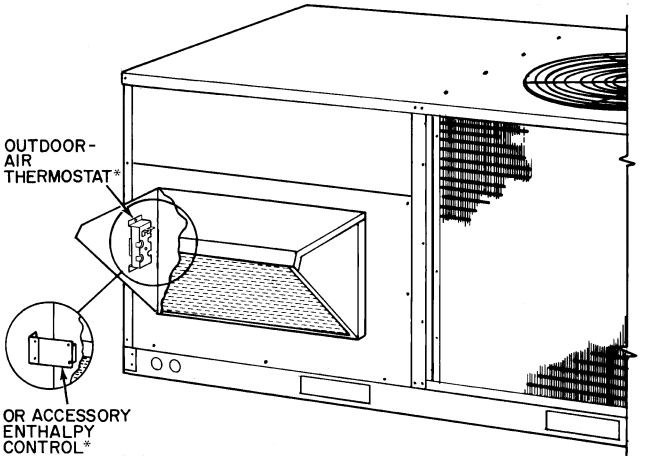
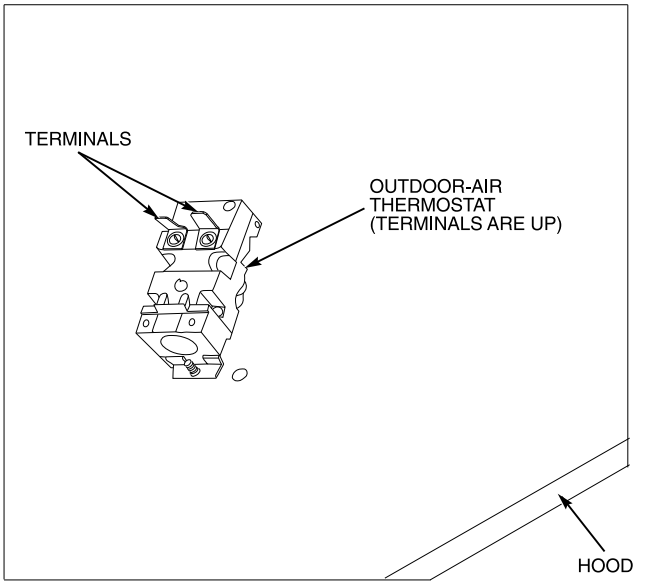


Fig. 25 — Durablade Economizer Minimum Position Damper Setting





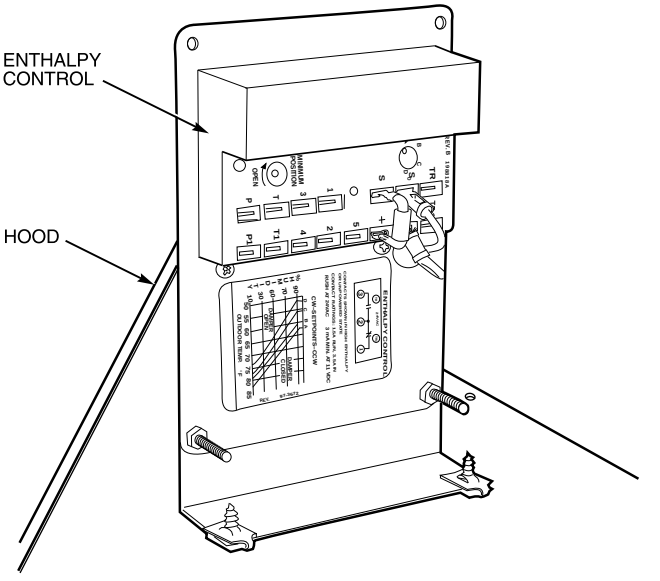


Fig. 26 — Outdoor-Air Thermostat/ Enthalpy Control Installation

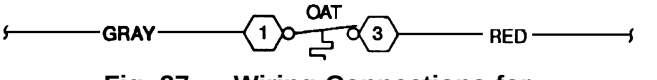


Fig. 27 — Wiring Connections for Outdoor-Air Thermostat

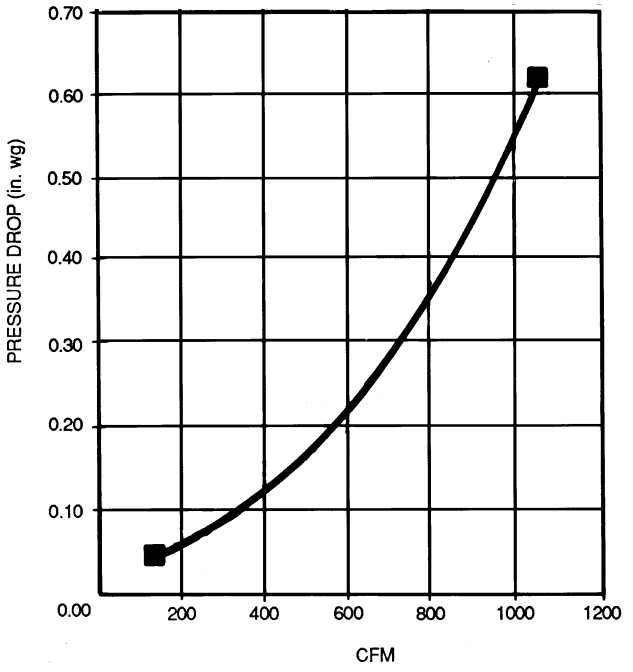


Fig. 28 — Durablade Economizer Barometric Relief Damper Characteristics

OPTIONAL PARABLADE ECONOMIZER — The optional PARABLADE economizer hood assembly is packaged and shipped in the filter section. Damper blades and control boards are installed at the factory and the economizer is shipped in the vertical discharge position.

NOTE: Horizontal discharge block-off plate is shipped with the air hood package. The PARABLADE economizer can only be used for vertical discharge applications. Discard this plate.

Assembly

1. Determine if ventilation air is required in building. If so, determine the minimum amount to be supplied by each unit and record quantity of ventilation air needed for use in Step 7.
2. Remove filter access panel by raising panel and swinging panel outward. Panel is now disengaged from track and can be removed. No tools are required to remove filter access panel. Remove outdoor-air opening panel. See Fig. 18. Save panels and screws. Remove optional economizer so the outdoor-air damper hood package can be removed from the filter section.
3. Assemble outdoor-air hood top and side plates as shown in Fig. 19. Install seal strips on hood top and sides. Put aside screen retainer and retainer screw for later assembly. *Do not attach hood to unit at this time.*
4. On 012 and 014 units, install vertical discharge block-off plate over duct openings. See Fig. 20.
5. Slide economizer into unit and secure with screws. See Fig. 29.

   NOTE: Be sure to engage rear economizer flange under tabs in vertical return-air opening.
6. Insert economizer plug into economizer harness. Remove tape from barometric relief damper. See Fig. 29.
7. If ventilation air is not required, proceed to Step 8. If ventilation air is required, perform the following:
   a. Make sure the factory-installed jumper is in place across terminals P and P1 on the economizer logic module. T and T1 should be disconnected during adjustment.
   b. The 2 potentiometers with slots for adjustment are located on the face of the economizer logic module. Turn the lower potentiometer fully clockwise. The dampers should be fully closed. Turn the potentiometer gradually counterclockwise until the desired position is reached.
   c. Connect T and T1 to the 24 v power supply.
   d. After installation is complete, calculate the minimum airflow across the economizer. To calculate the minimum airflow, the following data is needed: total cfm (cfm_3), temperature of the total cfm (T_3), temperature of the return air (T_1), and temperature of the entering outside air (T_2). Cfm_1 is the return air cfm, which will be the minimum airflow.

      Insert the data into the following equations:

      $$\frac{T_1\ (cfm_1) + T_2\ (cfm_2)}{cfm_3} = T_3$$

      $$cfm_2 = (cfm_3 - cfm_1)$$

      Therefore:

      $$\frac{T_1\ (cfm_1) + T_2\ (cfm_3 - cfm_1)}{cfm_3} = T_3$$

      Use this equation to determine cfm_1, which is the minimum airflow across the economizer.

      $$cfm_1 = \frac{(T_3 - T_2)\ cfm_3}{(T_1 - T_2)}$$

      If cfm_1 does not match the desired minimum airflow from Step 1, re-adjust the minimum position setting screw.
8. Determine the enthalpy changeover set point from Fig. 30. The enthalpy changeover set point should be set to return the outdoor air damper to the minimum position when enthalpy rises above the set point. The settings are A, B, C, and D. Set the enthalpy changeover per the setting in Fig. 30.
9. Replace outdoor-air opening panel using screws from Step 2. Replace filter access panel. Ensure the filter access panel slides along the tracks and is securely engaged. See Fig. 31.
10. Fasten hood top and side plate assembly (Fig. 32) to outdoor-air opening panel with screws provided.
11. Slide outdoor-air inlet screens into screen track on hood side plate. While holding screens in place, fasten screen-retainer to hood using screws provided. See Fig. 33.

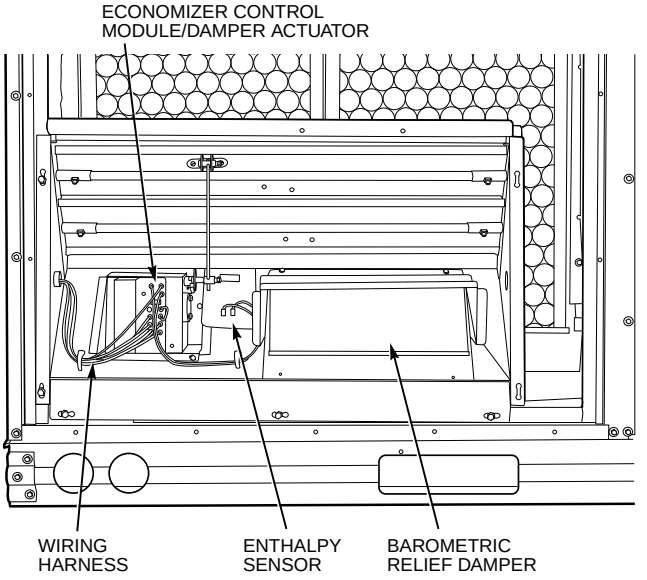
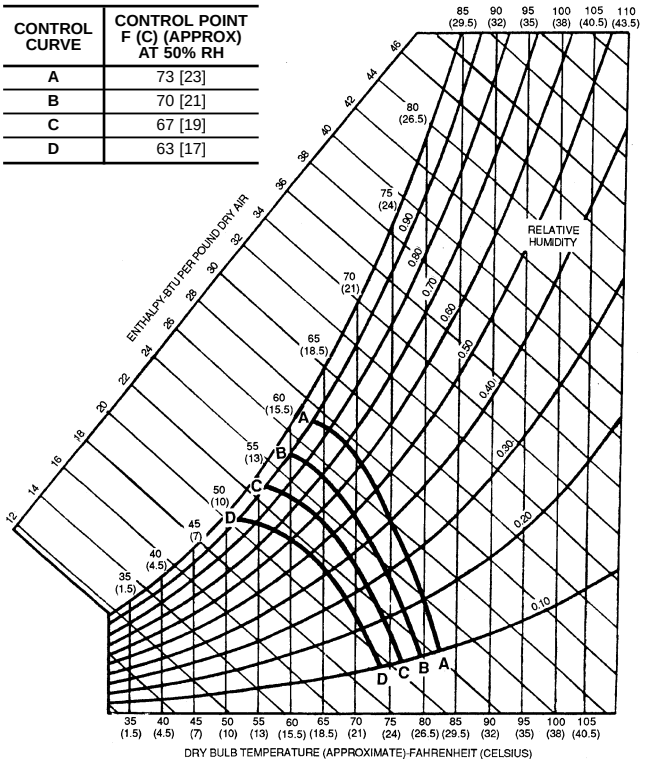


Fig. 29 — PARABLADE Economizer Installed in Unit

CONTROL CURVE	CONTROL POINT F (C) (APPROX) AT 50% RH
A	73 [23]
B	70 [21]
C	67 [19]
D	63 [17]



RH — Relative Humidity

Fig. 30 — Enthalpy Settings for PARABLADE Economizer

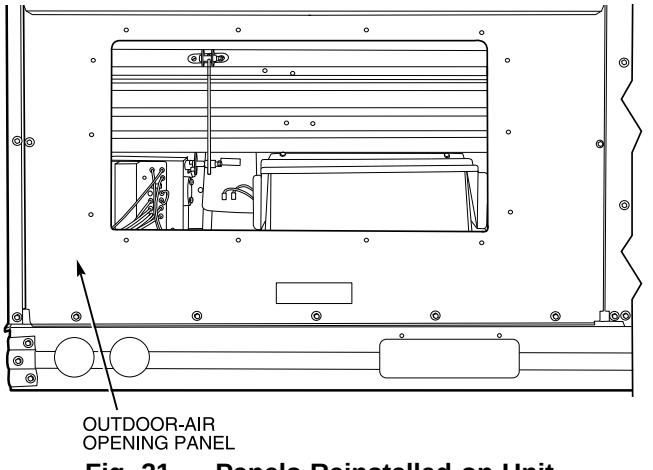


Fig. 31 — Panels Reinstalled on Unit

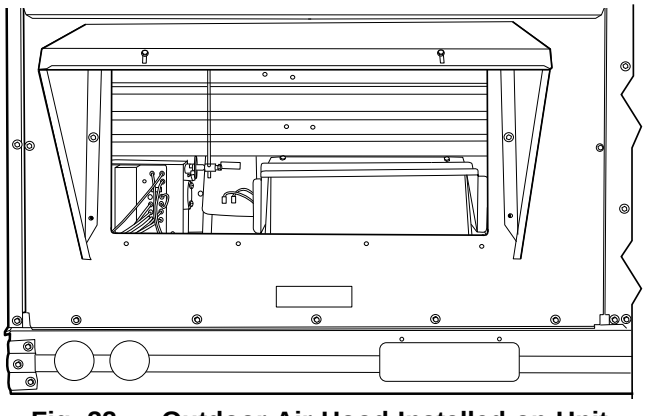


Fig. 32 — Outdoor-Air Hood Installed on Unit

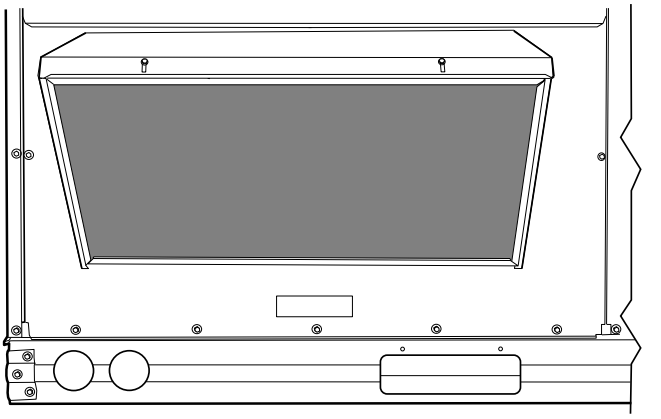


Fig. 33 — Filter Installed on Outdoor-Air Hood

Step 9 — Adjust Evaporator-Fan Speed — Adjust evaporator-fan speed to meet jobsite conditions.

Table 3 shows fan rpm at motor pulley settings, Table 4 shows motor efficiencies and Table 5 gives accessory static pressure drops. Table 6 shows motor performance. Refer to Tables 7-14 to determine fan speed settings. Fan motor pulleys are factory set for speed shown in Table 1.

To change fan speed:

1. Shut off unit power supply.
2. Loosen belt by loosening fan motor mounting plate nuts (see Fig. 34 and 35).
3. Loosen movable pulley flange setscrew (see Fig. 36).
4. Screw movable flange toward fixed flange to increase speed and away from fixed flange to decrease speed. Increasing fan speed increases load on motor. Do not exceed maximum speed specified in Table 1.
5. Set movable flange at nearest keyway of pulley hub and tighten setscrew (see Table 1 for speed change for each full turn of pulley flange).

To align fan and motor pulleys:

1. Loosen fan pulley setscrews.
2. Slide fan pulley along fan shaft.
3. Make angular alignment by loosening motor from mounting plate.

To adjust belt tension (see Fig. 34 and 35):

1. Loosen fan motor mounting plate nuts.
2. *Units 008,009* — Slide motor mounting plate away from fan scroll for proper belt tension (½-in. deflection with one finger) and tighten mounting nuts (see Fig. 34).

   Units 012,014 — Slide motor mounting plate downward to tighten belt tension. Secure motor mounting plate nuts. See Fig. 35.
3. Adjust bolt and nut on mounting plate to secure motor in fixed position.

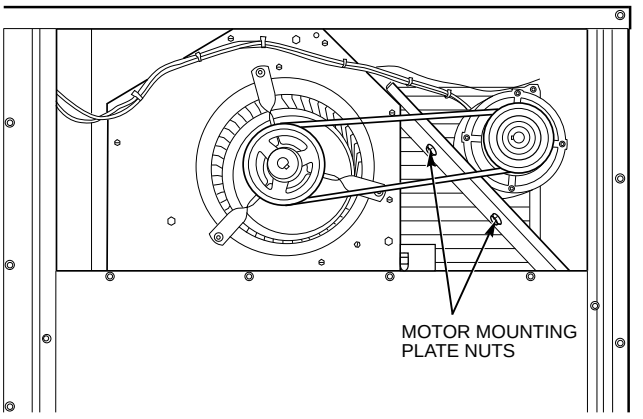


Fig. 34 — Typical Belt-Drive Motor Mounting for Sizes 008,009

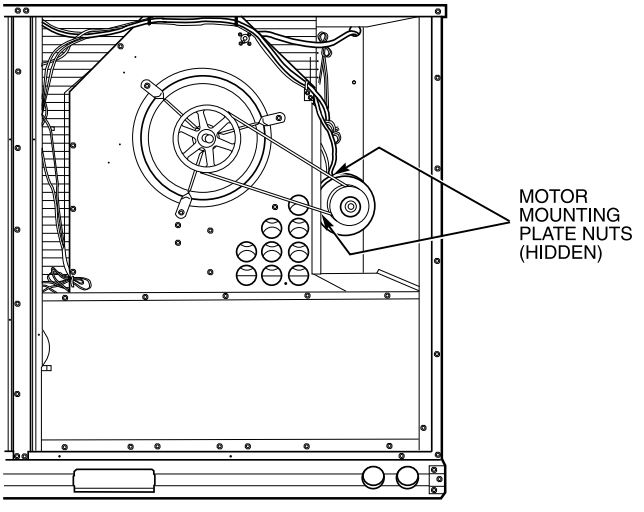


Fig. 35 — Typical Belt-Drive Motor Mounting for Sizes 012,014

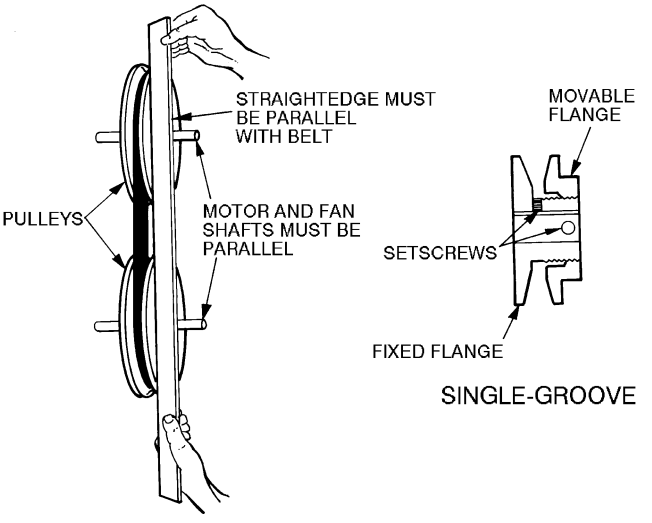


Fig. 36 — Evaporator-Fan Pulley Adjustment

Table 3 — Fan Rpm at Motor Pulley Settings*

UNIT 48TJ	MOTOR PULLEY TURNS OPEN												
	0	½	1	1½	2	2½	3	3½	4	4½	5	5½	6
008†	840	815	790	765	740	715	690	665	640	615	590	—	—
008**	935	910	885	860	835	810	785	760	735	710	685	—	—
009†	935	910	885	860	835	810	785	760	735	710	685	—	—
012†	935	910	885	860	835	810	785	760	735	710	685	—	—
012††	1085	1060	1035	1010	985	960	935	910	885	860	835	—	—
014†	1080	1060	1035	1015	990	970	950	925	905	880	860	—	—
014††	1260	1220	1185	1155	1130	1100	1075	1045	1015	990	960	930	900

*Approximate rpm shown.
†Indicates standard motor and drive.
**Indicates alternate drive.
††Indicates alternate motor and drive.

Table 4 — Evaporator-Fan Motor Efficiency

MOTOR	EFFICIENCY (%)
48TJD/TJE/TJF008,009	80
48TJD/TJE/TJF012 (Std)	80
48TJD/TJE/TJF012 (Alt)	83
48TJD/TJE014 (Std)	85
48TJD/TJE014 (Alt)	87

NOTE: Convert watts to bhp using the following formula:

$$bhp = \frac{\text{watts input x motor efficiency}}{746}$$

Table 5 — Economizer Static Pressure Drop (in. wg)

UNIT 48TJ	CFM								
	2200	**2500**	**3000**	**3500**	**4000**	**4500**	**5000**	**5500**	**6000**
Durablade Economizer	.02	.02	.03	.04	.05	.06	.07	.08	.09
PARABLADE Economizer	.21	.25	.35	.49	.61	—	—	—	—

Table 6 — Motor Data

UNIT 48TJ	EVAPORATOR-FAN MOTOR	MAXIMUM CONTINUOUS BHP*	MAXIMUM OPERATING WATTS*	UNIT VOLTAGE	MAXIMUM AMP DRAW
008	Std	2.40	2120	208/230	6.1
				460	2.7
				575	2.7
009	Std	2.40	2120	208/230	6.1
				460	2.7
				575	2.7
012	Std	2.40	2120	208/230	6.1
				460	2.7
				575	2.7
	Alt	2.90	2615	208/230	7.9
				460	3.6
				575	3.6
014	Std	4.20	3775	208/230	11.1
				460	5.0
				575	5.0
	Alt	5.25	4400	208/230	15.0
				460	7.4
				575	7.4

LEGEND

Bhp — Brake Horsepower

*Extensive motor and electrical testing on these units ensures that the full horsepower and watts range of the motors can be utilized with confidence. Using your fan motors up to the ratings shown in this table will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.

Table 7 — Fan Performance, 48TJ008 — Vertical Discharge Units

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)															
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2200	**506**	**0.52**	**586**	**0.72**	656	0.95	718	1.18	776	1.43	838	1.78	898	2.21	935	2.58
2250	**514**	**0.55**	593	0.76	662	0.99	724	1.22	781	1.78	841	1.81	902	2.25	939	2.60
2300	**521**	**0.57**	600	0.79	668	1.02	730	1.26	786	1.50	843	1.83	905	2.28	943	2.62
2400	**536**	**0.63**	613	0.85	680	1.09	741	1.34	796	1.59	849	1.88	910	2.31	952	2.74
2500	**551**	**0.69**	626	0.93	693	1.17	753	1.43	808	1.69	859	1.96	912	2.31	963	2.81
2550	**559**	**0.72**	634	0.97	700	1.21	759	1.48	814	1.74	864	2.01	915	2.34	968	2.81
2600	**567**	**0.75**	641	1.00	706	1.25	764	1.52	819	1.79	869	2.06	918	2.37	973	2.81
2700	**582**	**0.83**	655	1.08	719	1.34	776	1.61	831	1.89	880	2.17	927	2.47	976	2.84
2800	598	0.90	670	1.17	732	1.43	789	1.71	842	2.00	892	2.29	938	2.58	983	2.92
2900	614	0.98	684	1.25	745	1.53	802	1.81	854	2.11	903	2.42	949	2.71	993	3.03
3000	630	1.07	699	1.35	759	1.63	815	1.92	866	2.23	915	2.54	961	2.85	1003	3.17
3100	646	1.16	714	1.45	773	1.74	828	2.04	878	2.35	926	2.67	972	3.00	1015	3.32
3200	662	1.26	729	1.55	787	1.86	841	2.16	891	2.48	938	2.81	983	3.14	1026	3.47
3300	679	1.36	744	1.66	801	1.98	854	2.29	904	2.61	950	2.95	995	3.30	—	—
3400	695	1.47	759	1.78	816	2.10	867	2.42	917	2.75	963	3.10	1007	3.45	—	—
3500	712	1.59	774	1.90	830	2.23	881	2.56	930	2.90	976	3.25	—	—	—	—
3600	729	1.71	790	2.03	845	2.37	895	2.71	943	3.05	988	3.41	—	—	—	—
3700	745	1.84	805	2.17	860	2.52	909	2.87	956	3.22	—	—	—	—	—	—
3750	754	1.91	813	2.24	868	2.59	917	2.95	963	3.30	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan

NOTES:
1. **Boldface** indicates field-supplied drive required. (See Note 4.)
2. ▭ indicates alternate drive required.
3. ▭ indicates field-supplied motor and drive required.
4. Standard drive range is 590 to 840 rpm. Alternate drive range is 685 to 935 rpm. All other rpms require a field-supplied drive.
5. Values include losses for filters, unit casing, and wet coils.
6. Maximum continuous bhp is 2.4. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
7. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative to verify.
8. Interpolation is permissible. Do not extrapolate.

Table 8 — Fan Performance, 48TJ009 — Vertical Discharge Units

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)															
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	**559**	**0.72**	**634**	**0.97**	700	1.21	759	1.48	814	1.74	864	2.01	915	2.34	968	2.81
2600	**567**	**0.75**	**641**	**1.00**	706	1.25	764	1.52	819	1.79	869	2.06	918	2.37	973	2.81
2700	**582**	**0.83**	**655**	**1.08**	719	1.34	776	1.61	831	1.89	880	2.17	927	2.47	976	2.84
2800	**598**	**0.90**	**670**	**1.17**	732	1.43	789	1.71	842	2.00	892	2.29	938	2.58	983	2.92
2900	**614**	**0.98**	**684**	**1.25**	745	1.53	802	1.81	854	2.11	903	2.42	949	2.71	993	3.03
3000	**630**	**1.07**	690	1.35	759	1.63	815	1.92	866	2.23	915	2.54	961	2.85	1003	3.17
3100	**646**	**1.16**	714	1.45	773	1.74	828	2.04	878	2.35	926	2.67	972	3.00	1016	3.32
3200	**662**	**1.26**	729	1.55	787	1.86	841	2.16	891	2.48	938	2.81	983	3.14	1026	3.47
3300	**679**	**1.36**	744	1.66	801	1.98	854	2.29	904	2.61	950	2.95	995	3.30	—	—
3400	695	1.47	759	1.78	816	2.10	867	2.42	917	2.75	963	3.10	1007	3.45	—	—
3500	712	1.59	774	1.90	830	2.23	881	2.56	930	2.90	976	3.25	—	—	—	—
3600	729	1.71	790	2.03	845	2.37	895	2.71	943	3.05	988	3.41	—	—	—	—
3700	745	1.84	805	2.17	860	2.52	909	2.87	956	3.22	—	—	—	—	—	—
3750	754	1.91	813	2.24	868	2.59	917	2.95	963	3.30	—	—	—	—	—	—
3800	762	1.98	821	2.31	875	2.66	924	3.03	970	3.38	—	—	—	—	—	—
3900	779	2.12	836	2.46	890	2.82	938	3.19	—	—	—	—	—	—	—	—
4000	796	2.27	852	2.61	905	2.98	953	3.37	—	—	—	—	—	—	—	—
4100	813	2.42	868	2.78	920	3.15	—	—	—	—	—	—	—	—	—	—
4200	830	2.59	884	2.95	935	3.33	—	—	—	—	—	—	—	—	—	—
4250	839	2.68	890	3.04	—	—	—	—	—	—	—	—	—	—	—	—
4300	847	2.76	900	3.13	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan

NOTES:
1. **Boldface** indicates field-supplied drive required. (See Note 3.)
2. ▭ indicates field-supplied motor and drive required.
3. Standard drive range is 685 to 935 rpm. All other rpms require a field-supplied drive.
4. Values include losses for filters, unit casing, and wet coils.
5. Maximum continuous bhp is 2.4. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative to verify.
7. Interpolation is permissible. Do not extrapolate.

Table 9 — Fan Performance, 48TJ012 — Vertical Discharge Units

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	**592**	**0.76**	**661**	**0.93**	722	1.09	779	1.26	829	1.42	880	1.58	924	1.73	970	1.89	1019	2.00	1066	2.30
3100	**607**	**0.83**	**676**	**1.01**	734	1.17	791	1.34	840	1.51	890	1.68	935	1.84	977	2.00	1026	2.17	1070	2.44
3200	**622**	**0.90**	690	1.09	746	1.25	803	1.43	852	1.60	900	1.77	946	1.95	987	2.11	1029	2.28	1075	2.51
3300	**638**	**0.98**	705	1.17	759	1.33	815	1.52	864	1.70	910	1.88	957	2.06	998	2.23	1037	2.40	1082	2.58
3400	**653**	**1.06**	719	1.26	772	1.43	826	1.62	876	1.81	921	1.98	967	2.17	1009	2.35	1047	2.53	1087	2.70
3500	**669**	**1.15**	733	1.35	786	1.53	838	1.72	888	1.91	933	2.10	976	2.29	1020	2.48	1058	2.66	1095	2.84
3600	**684**	**1.24**	747	1.44	800	1.64	850	1.82	900	2.03	945	2.22	986	2.41	1030	2.61	1069	2.80	1106	2.98
3700	700	1.33	760	1.54	814	1.75	863	1.92	912	2.14	957	2.34	998	2.54	1039	2.74	1081	2.94	1117	3.13
3800	715	1.43	774	1.64	828	1.86	875	2.04	924	2.26	969	2.47	1010	2.67	1049	2.87	1091	3.08	1128	3.29
3900	731	1.54	787	1.74	843	1.98	888	2.16	936	2.38	981	2.60	1022	2.81	1060	3.02	1100	3.23	—	—
4000	747	1.64	801	1.85	857	2.10	902	2.30	948	2.51	993	2.74	1034	2.96	1072	3.17	1110	3.38	—	—
4100	763	1.76	816	1.97	872	2.23	916	2.44	960	2.64	1005	2.88	1046	3.11	1084	3.32	—	—	—	—
4200	778	1.88	831	2.10	886	2.36	929	2.58	972	2.78	1016	3.03	1058	3.26	—	—	—	—	—	—
4300	794	2.00	846	2.23	900	2.50	943	2.73	985	2.93	1028	3.17	—	—	—	—	—	—	—	—
4400	810	2.13	861	2.37	913	2.64	958	2.89	999	3.09	1040	3.32	—	—	—	—	—	—	—	—
4500	826	2.27	876	2.52	927	2.78	973	3.04	1012	3.26	—	—	—	—	—	—	—	—	—	—
4600	842	2.41	892	2.67	940	2.92	987	3.21	—	—	—	—	—	—	—	—	—	—	—	—
4700	858	2.55	907	2.83	954	3.08	1002	3.38	—	—	—	—	—	—	—	—	—	—	—	—
4800	874	2.70	922	2.99	968	3.24	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4900	890	2.86	938	3.16	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5000	906	3.03	953	3.33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan

NOTES:
1. **Boldface** indicates field-supplied drive required. (See Note 4.)
2. indicates alternate motor and/or drive required.
3. indicates field-supplied motor and drive required.
4. Standard drive range is 685 to 935 rpm. Alternate drive range is 835 to 1085 rpm. All other rpms require a field-supplied drive.
5. Values include losses for filters, unit casing, and wet coils.
6. Maximum continuous bhp is 2.4 for the standard motor and 2.9 for the alternate motor. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
7. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative to verify.
8. Interpolation is permissible. Do not extrapolate.

Table 10 — Fan Performance, 48TJ014 — Vertical Discharge Units

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3700	**729**	**1.36**	**790**	**1.58**	**847**	**1.79**	902	2.06	955	2.29	1008	2.55	1060	2.80	1108	3.05	1152	3.27	1190	3.46
3800	**745**	**1.46**	**805**	**1.69**	861	1.89	915	2.17	967	2.41	1019	2.67	1070	2.94	1118	3.19	1163	3.44	1203	3.65
3900	**761**	**1.56**	**820**	**1.80**	875	2.01	928	2.29	979	2.55	1029	2.80	1079	3.07	1128	3.34	1173	3.60	1214	3.83
4000	**777**	**1.67**	**836**	**1.92**	889	2.14	941	2.40	991	2.68	1040	2.94	1089	3.22	1137	3.49	1183	3.76	1225	4.00
4100	**793**	**1.79**	**851**	**2.05**	904	2.27	955	2.52	1004	2.82	1052	3.08	1100	3.36	1147	3.65	1193	3,93	1236	4.19
4200	**810**	**1.91**	867	2.18	918	2.41	968	2.65	1017	2.96	1064	3.23	1110	3.51	1157	3.81	1202	4.09	1245	4.38
4300	**826**	**2.04**	883	2.32	933	2.55	982	2.79	1030	3.11	1076	3.40	1121	3.67	1167	3.97	1212	4.27	1255	4.56
4400	**842**	**2.17**	898	2.46	948	2.70	996	2.93	1043	3.25	1088	3.56	1133	3.84	1178	4.14	1222	4.44	1265	4.74
4500	**859**	**2.31**	914	2.60	962	2.85	1010	3.09	1056	3.40	1101	3.73	1144	4.00	1188	4.31	1232	4.62	1274	4.93
4600	876	2.45	930	2.76	977	3.01	1024	3.26	1070	3.55	1114	3.90	1157	4.19	1199	4.49	1242	4.81	1284	5.13
4700	892	2.60	945	2.91	992	3.18	1039	3.43	1083	3.71	1126	4.07	1169	4.38	1210	4.68	1252	5.00	1294	5.33
4800	909	2.77	961	3.07	1008	3.36	1053	3.61	1097	3.88	1140	4.25	1181	4.58	1222	4.87	1263	5.20	—	—
4900	926	2.93	977	3.24	1024	3.54	1068	3.80	1111	4.06	1153	4.41	1194	4.77	1234	5.09	1274	5.40	—	—
5000	942	3.11	993	3.41	1039	3.73	1080	3.99	1125	4.25	1166	4.59	1207	4.97	1247	5.30	1286	5.62	—	—
5100	959	3.29	1009	3.60	1055	3.92	1097	4.19	1139	4.46	1180	4.78	1220	5.18	1259	5.52	—	—	—	—
5200	976	3.47	1025	3.78	1071	4.12	1112	4.40	1153	4.67	1194	4.98	1233	5.38	1272	5.74	—	—	—	—
5300	993	3.67	1041	3.98	1086	4.33	1127	4.61	1168	4.90	1208	5.19	1246	5.58	—	—	—	—	—	—
5400	1010	3.87	1057	4.18	1102	4.54	1142	4.84	1182	5.13	1221	5.41	—	—	—	—	—	—	—	—
5500	1027	4.07	1073	4.39	1118	4.76	1157	5.07	1197	5.36	1235	5.64	—	—	—	—	—	—	—	—
5600	1043	4.29	1090	4.61	1133	4.99	1173	5.31	1211	5.61	—	—	—	—	—	—	—	—	—	—
5700	1060	4.51	1106	4.83	1149	5.22	1189	5.55	—	—	—	—	—	—	—	—	—	—	—	—
5800	1077	4.74	1122	5.07	1165	5.45	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5900	1094	4.98	1139	5.31	1181	5.70	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6000	1111	5.22	1155	5.55	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6100	1128	5.48	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6200	1145	5.74	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan

NOTES:
1. **Boldface** indicates field-supplied drive required. (See Note 4.)
2. indicates alternate motor and/or drive required.
3. indicates field-supplied motor and drive required.
4. Standard drive range is 860 to 1080 rpm. Alternate drive range is 900 to 1260 rpm. All other rpms require a field-supplied drive.
5. Values include losses for filters, unit casing, and wet coils.
6. Maximum continuous bhp is 4.2 for the standard motor and 5.25 for the alternate motor. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
7. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative to verify.
8. Interpolation is permissible. Do not extrapolate.

Table 11 — Fan Performance, 48TJ008 — Horizontal Discharge Units

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)																	
	0.2		0.4		0.6		0.8		0.9		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2200	**499**	**0.50**	**580**	**0.70**	652	0.94	717	1.17	748	1.30	779	1.43	839	1.78	905	2.21	951	2.57
2250	**507**	**0.53**	**586**	**0.73**	658	0.97	722	1.22	752	1.34	783	1.46	843	1.81	908	2.25	955	2.59
2300	**513**	**0.55**	592	0.76	663	1.00	727	1.26	756	1.38	786	1.49	846	1.84	910	2.25	959	2.61
2400	**528**	**0.60**	606	0.83	674	1.06	738	1.34	766	1.46	795	1.58	853	1.88	912	2.31	967	2.68
2500	**542**	**0.66**	619	0.90	686	1.13	748	1.41	777	1.55	806	1.68	859	1.94	919	2.37	971	2.73
2550	**550**	**0.69**	627	0.94	692	1.17	754	1.45	783	1.60	812	1.74	864	1.99	920	2.39	974	2.76
2600	**557**	**0.72**	634	0.97	698	1.21	759	1.49	787	1.64	816	1.79	868	2.04	921	2.41	976	2.78
2700	**573**	**0.79**	648	1.05	711	1.29	770	1.58	798	1.73	827	1.88	878	2.16	928	2.45	983	2.88
2800	**588**	**0.86**	662	1.13	723	1.38	782	1.66	809	1.82	837	1.98	889	2.29	937	2.57	986	2.91
2900	604	0.94	676	1.21	737	1.48	794	1.76	821	1.92	848	2.08	900	2.41	947	2.70	993	3.01
3000	620	1.02	690	1.30	750	1.58	806	1.86	832	2.02	849	2.18	910	2.52	958	2.85	1002	3.15
3100	636	1.11	704	1.39	764	1.69	818	1.97	844	2.13	870	2.29	920	2.64	968	2.99	1012	3.30
3200	652	1.21	718	1.49	778	1.80	831	2.09	856	2.25	882	2.40	931	2.76	979	3.13	1023	3.47
3300	668	1.31	732	1.59	793	1.92	844	2.21	869	2.37	894	2.53	942	2.89	989	3.26	1034	3.63
3400	684	1.41	747	1.70	807	2.04	857	2.35	882	2.51	907	2.66	954	3.02	1000	3.40	1044	3.79
3500	701	1.53	762	1.82	821	2.16	871	2.48	895	2.64	919	2.80	966	3.15	1011	3.55	1054	3.94
3600	717	1.65	777	1.94	835	2.29	885	2.63	908	2.79	932	2.95	978	3.30	1022	3.69	1065	4.10
3700	733	1.77	792	2.07	849	2.42	899	2.78	922	2.95	945	3.11	990	3.45	1034	3.84	1076	4.26
3750	742	1.84	800	2.14	856	2.49	907	2.86	929	3.03	952	3.20	997	3.54	1040	3.93	1082	5.27

LEGEND

Bhp — Brake Horsepower Input to Fan

NOTES:
1. **Boldface** indicates field-supplied drive required. (See Note 4.)
2. ▭ indicates alternate drive required.
3. ▭ indicates field-supplied motor and drive required.
4. Standard drive range is 590 to 840 rpm. Alternate drive range is 685 to 935 rpm. All other rpms require a field-supplied drive.
5. Values include losses for filters, unit casing, and wet coils.
6. Maximum continuous bhp is 2.4. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
7. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative to verify.
8. Interpolation is permissible. Do not extrapolate.

Table 12 — Fan Performance, 48TJ009 — Horizontal Discharge Units

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)																	
	0.2		0.4		0.6		0.8		0.9		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
2550	**550**	**0.69**	**627**	**0.94**	692	1.17	754	1.45	783	1.60	812	1.74	864	1.99	920	2.39	974	2.76
2600	**557**	**0.72**	**634**	**0.97**	698	1.21	759	1.49	787	1.64	816	1.79	868	2.04	921	2.41	976	2.78
2700	**573**	**0.79**	**648**	**1.05**	711	1.29	770	1.58	798	1.73	827	1.88	878	2.16	928	2.45	983	2.88
2800	**588**	**0.86**	**662**	**1.13**	723	1.38	782	1.66	809	1.82	837	1.98	889	2.29	937	2.57	986	2.91
2900	**604**	**0.94**	**676**	**1.21**	737	1.48	794	1.76	821	1.92	848	2.08	900	2.41	947	2.70	993	3.01
3000	**620**	**1.02**	690	1.30	750	1.58	806	1.86	832	2.02	849	2.18	910	2.52	958	2.85	1002	3.15
3100	**636**	**1.11**	704	1.39	764	1.69	818	1.97	844	2.13	870	2.29	920	2.64	968	2.99	1012	3.30
3200	**652**	**1.21**	718	1.49	778	1.80	831	2.09	856	2.25	882	2.40	931	2.76	979	3.13	1023	3.47
3300	**668**	**1.31**	732	1.59	793	1.92	844	2.21	869	2.37	894	2.53	942	2.89	989	3.26	1034	3.63
3400	**684**	**1.41**	747	1.70	807	2.04	857	2.35	882	2.51	907	2.66	954	3.02	1000	3.40	1044	3.79
3500	701	1.53	762	1.82	821	2.16	871	2.48	895	2.64	919	2.80	966	3.15	1011	3.55	1054	3.94
3600	717	1.65	777	1.94	835	2.29	885	2.63	908	2.79	932	2.95	978	3.30	1022	3.69	1065	4.10
3700	733	1.77	792	2.07	849	2.42	899	2.78	922	2.95	945	3.11	990	3.45	1034	3.84	1076	4.26
3750	742	1.84	800	2.14	856	2.49	907	2.86	929	3.03	952	3.20	997	3.54	1040	3.93	1082	5.27
3800	750	1.90	807	2.21	863	2.56	914	2.93	936	3.11	958	3.28	1003	3.62	1045	4.01	1087	4.43
3900	767	2.04	822	2.35	877	2.71	928	3.09	950	3.27	972	3.45	1015	3.80	1057	4.18	1098	4.60
4000	783	2.18	838	2.50	891	2.86	942	3.26	964	3.45	986	3.63	1028	3.99	1070	4.36	1110	4.78
4100	800	2.34	854	2.66	905	3.02	956	2.43	978	3.62	1000	3.81	1042	4.18	1082	4.56	1122	4.97
4200	817	2.49	869	2.82	920	3.19	970	3.60	992	3.80	1015	4.00	1055	4.38	1095	4.76	1134	5.16
4250	826	2.58	877	2.91	928	3.28	977	3.69	999	3.90	1022	4.10	1062	4.49	1102	4.87	1140	5.27
4300	834	2.66	885	3.00	935	3.37	984	3.78	1006	3.99	1029	4.20	1069	4.59	1108	4.98	1147	5.38

LEGEND

Bhp — Brake Horsepower Input to Fan

NOTES:
1. **Boldface** indicates field-supplied drive required. (See Note 3.)
2. ▭ indicates field-supplied motor and drive required.
3. Standard drive range is 685 to 935 rpm. All other rpms require a field-supplied drive.
4. Values include losses for filters, unit casing, and wet coils.
5. Maximum continuous bhp is 2.4. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
6. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative to verify.
7. Interpolation is permissible. Do not extrapolate.

Table 13 — Fan Performance, 48TJ012 — Horizontal Discharge Units

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3000	**552**	**0.68**	**632**	**0.87**	701	1.05	761	1.22	816	1.36	871	1.54	918	1.67	967	1.89	1010	2.09	1063	2.46
3100	**565**	**0.74**	**644**	**0.93**	711	1.12	772	1.31	825	1.45	879	1.63	928	1.78	973	1.94	1018	2.17	1070	2.51
3200	**578**	**0.81**	**656**	**1.00**	723	1.20	782	1.39	835	1.55	887	1.71	937	1.90	981	2.04	1026	2.26	1075	2.57
3300	**591**	**0.88**	**668**	**1.08**	734	1.28	793	1.47	845	1.65	895	1.80	946	2.00	991	2.16	1032	2.32	1080	2.64
3400	**605**	**0.96**	**680**	**1.16**	745	1.36	803	1.56	856	1.75	904	1.91	953	2.10	1000	2.29	1041	2.44	1083	2.65
3500	**619**	**1.04**	691	1.23	755	1.44	813	1.65	867	1.86	914	2.03	961	2.20	1009	2.41	1051	2.57	1090	2.74
3600	**633**	**1.13**	703	1.31	766	1.52	824	1.74	877	1.97	924	2.15	970	2.32	1017	2.53	1061	2.72	1099	2.88
3700	**648**	**1.23**	714	1.39	777	1.61	835	1.85	887	2.07	935	2.28	980	2.45	1024	2.64	1069	2.87	1109	3.03
3800	**662**	**1.33**	726	1.51	789	1.72	846	1.95	897	2.18	946	2.40	989	2.58	1033	2.76	1077	2.99	1118	3.20
3900	**677**	**1.44**	738	1.61	801	1.82	857	2.06	908	2.29	956	2.53	1000	2.73	1042	2.91	1085	3.12	1127	3.36
4000	692	1.55	750	1.73	813	1.94	868	2.17	918	2.40	967	2.66	1010	2.87	1052	3.06	1093	3.24	—	—
4100	707	1.67	762	1.84	825	2.05	878	2.28	929	2.53	977	2.78	1021	3.02	1062	3.22	1102	3.41	—	—
4200	722	1.80	775	1.97	837	2.16	889	2.40	941	2.66	987	2.91	1032	3.17	1072	3.38	—	—	—	—
4300	737	1.94	787	2.09	848	2.27	900	2.52	952	2.80	999	3.04	1042	3.32	—	—	—	—	—	—
4400	752	2.08	800	2.21	860	2.39	912	2.66	962	2.93	1008	3.19	—	—	—	—	—	—	—	—
4500	768	2.24	814	2.35	871	2.51	924	2.80	973	3.07	1019	3.34	—	—	—	—	—	—	—	—
4600	783	2.40	827	2.50	883	2.64	937	2.95	983	3.21	—	—	—	—	—	—	—	—	—	—
4700	799	2.56	841	2.64	894	2.77	949	3.10	994	3.36	—	—	—	—	—	—	—	—	—	—
4800	814	2.74	855	2.80	906	2.91	961	3.26	—	—	—	—	—	—	—	—	—	—	—	—
4900	—	—	868	2.90	918	3.05	972	3.40	—	—	—	—	—	—	—	—	—	—	—	—
5000	—	—	883	3.10	931	3.21	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan

NOTES:
1. **Boldface** indicates field-supplied drive required. (See Note 4.)
2. indicates alternate motor and/or drive required.
3. indicates field-supplied motor and drive required.
4. Standard drive range is 685 to 935 rpm. Alternate drive range is 835 to 1085 rpm. All other rpms require a field-supplied drive.
5. Values include losses for filters, unit casing, and wet coils.
6. Maximum continuous bhp is 2.4 for the standard motor and 2.9 for the alternate motor. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
7. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative to verify.
8. Interpolation is permissible. Do not extrapolate.

Table 14 — Fan Performance, 48TJ014 — Horizontal Discharge Units

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)																			
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
3700	**677**	**1.20**	**748**	**1.43**	**810**	**1.65**	869	1.89	928	2.17	984	2.43	1036	2.68	1080	2.90	1114	3.07	1135	3.17
3800	**691**	**1.28**	**761**	**1.52**	**822**	**1.75**	880	1.98	937	2.28	993	2.55	1046	2.81	1092	3.05	1129	3.25	1156	3.39
3900	**705**	**1.37**	**773**	**1.62**	**834**	**1.86**	891	2.08	947	2.39	1002	2.66	1055	2.94	1102	3.20	1143	3.42	1174	3.59
4000	**720**	**1.47**	**786**	**1.71**	**847**	**1.97**	902	2.19	957	2.50	1011	2.79	1064	3.07	1112	3.34	1155	3.59	1190	3.80
4100	**734**	**1.56**	**800**	**1.82**	860	2.09	914	2.31	967	2.60	1021	2.91	1072	3.20	1121	3.49	1165	3.76	1203	3.99
4200	**749**	**1.66**	**813**	**1.92**	873	2.21	926	2.44	978	2.71	1030	3.04	1081	3.34	1130	3.64	1175	3.92	1215	4.18
4300	**764**	**1.77**	**826**	**2.04**	886	2.33	938	2.57	989	2.83	1040	3.18	1090	3.48	1139	3.79	1185	4.08	1226	4.36
4400	**779**	**1.88**	**840**	**2.16**	899	2.46	951	2.71	1000	2.96	1050	3.31	1100	3.63	1148	3.94	1194	4.25	1236	4.54
4500	**793**	**1.99**	**854**	**2.28**	912	2.59	963	2.86	1012	3.09	1061	3.43	1109	3.78	1157	4.09	1203	4.42	1246	4.72
4600	**808**	**2.11**	868	2.42	925	2.73	975	3.00	1024	3.25	1071	3.56	1119	3.93	1166	4.26	1212	4.58	1255	4.91
4700	**822**	**2.24**	882	2.56	937	2.86	988	3.16	1036	3.42	1082	3.70	1129	4.09	1175	4.43	1221	4.76	1264	5.09
4800	**837**	**2.37**	896	2.71	950	3.00	1001	3.32	1048	3.59	1093	3.86	1139	4.24	1185	4.60	1230	4.93	1273	5.28
4900	**852**	**2.51**	910	2.86	963	3.15	1014	3.48	1060	3.76	1105	4.02	1150	4.38	1194	4.77	1239	5.12	1282	5.47
5000	867	2.65	924	3.01	977	3.30	1027	3.65	1073	3.94	1117	4.20	1161	4.54	1204	4.95	1248	5.31	1291	5.66
5100	882	2.79	938	3.17	990	3.46	1040	3.82	1085	4.12	1129	4.40	1172	4.71	1214	5.13	1257	5.51	—	—
5200	896	2.95	952	3.33	1003	3.63	1053	4.00	1098	4.30	1141	4.60	1183	4.91	1225	5.29	1267	5.70	—	—
5300	911	3.11	967	3.50	1017	3.80	1066	4.18	1111	4.50	1153	4.80	1194	5.08	1236	5.47	—	—	—	—
5400	926	3.27	981	3.68	1030	3.98	1079	4.35	1124	4.70	1166	5.01	1206	5.29	1247	5.65	—	—	—	—
5500	940	3.44	995	3.86	1044	4.17	1092	4.54	1137	4.91	1178	5.22	1218	5.52	—	—	—	—	—	—
5600	955	3.62	1010	4.04	1058	4.38	1105	4.73	1150	5.12	1190	5.44	1230	5.75	—	—	—	—	—	—
5700	970	3.80	1024	4.23	1072	4.59	1118	4.93	1163	5.34	1203	5.67	—	—	—	—	—	—	—	—
5800	985	3.99	1039	4.42	1086	4.80	1131	5.14	1176	5.56	—	—	—	—	—	—	—	—	—	—
5900	1000	4.18	1053	4.62	1100	5.02	1144	5.36	—	—	—	—	—	—	—	—	—	—	—	—
6000	1015	4.39	1068	4.83	1114	5.25	1158	5.58	—	—	—	—	—	—	—	—	—	—	—	—
6100	1030	4.59	1083	5.04	1128	5.48	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6200	1046	4.81	1097	5.26	1142	5.71	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower Input to Fan

NOTES:
1. **Boldface** indicates field-supplied drive required. (See Note 4.)
2. indicates alternate motor and/or drive required.
3. indicates field-supplied motor and drive required.
4. Standard drive range is 860 to 1080 rpm. Alternate drive range is 900 to 1260 rpm. All other rpms require a field-supplied drive.
5. Values include losses for filters, unit casing, and wet coils.
6. Maximum continuous bhp is 4.2 for the standard motor and 5.25 for the alternate motor. Extensive motor and electrical testing on these units ensures that the full range of the motor can be utilized with confidence. Using your fan motors up to the ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
7. Use of a field-supplied motor may affect wire sizing. Contact your Carrier representative to verify.
8. Interpolation is permissible. Do not extrapolate.

START-UP

Unit Preparation — Make sure that unit has been installed in accordance with these installation instructions and applicable codes. Make sure that Start-Up Checklist has been completed and filled out.

Return-Air Filters — Make sure correct filters are installed in filter tracks (see Table 1). Do not operate unit without return-air filters.

Outdoor-Air Inlet Screens — Outdoor-air inlet screens must be in place before operating unit.

Compressor Mounting — Compressors are internally spring mounted. Do not loosen or remove compressor holddown bolts. On 48TJ014 units, remove the tiedown bands that hold the compressors together.

Internal Wiring — Check all electrical connections in unit control boxes. Tighten as required.

Refrigerant Service Ports — Each refrigerant system has 4 Schrader-type service gage ports: one on the suction line, one on the liquid line, and two on the compressor discharge line. Be sure that caps on the ports are tight. One Schrader-type valve is located under both the high-pressure switch and the low-pressure switch when ordered as an option.

Compressor Rotation — On 3-phase units with scroll compressors, it is important to be certain compressor is rotating in the proper direction. To determine whether or not compressor is rotating in the proper direction:

1. Connect service gages to suction and discharge pressure fittings.
2. Energize the compressor.
3. The suction pressure should drop and the discharge pressure should rise, as is normal on any start-up.

If the suction pressure does not drop and the discharge pressure does not rise to normal levels:

1. Note that the evaporator fan is probably also rotating in the wrong direction.
2. Turn off power to the unit.
3. Reverse any two of the unit power leads.
4. Reapply power to the compressor.

The suction and discharge pressure levels should now move to their normal start-up levels.

NOTE: When the compressor is rotating in the wrong direction, the unit will make an elevated level of noise and will not provide cooling.

Cooling — To start unit, turn on main power supply. Set system selector switch at COOL position and fan switch at AUTO. position. Adjust thermostat to a setting below room temperature. Compressor starts on closure of contactor.

Check unit charge. Refer to Service, Refrigerant Charge section, page 26.

Reset thermostat at a position above room temperature. Compressor will shut off. Evaporator fan will shut off after 30-second delay.

TO SHUT OFF UNIT — Set system selector switch at OFF position. Resetting thermostat at a position above room temperature shuts unit off temporarily until space temperature exceeds thermostat setting.

Main Burners — Main burners are factory set and should require no adjustment.

TO CHECK ignition of main burners and heating controls, move thermostat set point above room temperature and verify that the burners light and evaporator fan is energized. After ensuring that the unit continues to heat the building, lower the thermostat setting below the room temperature and verify that the burners and evaporator fan turn off (fan will turn off only if fan selector switch is in the AUTO. position). Refer to Table 15 for the correct orifice to use at high altitudes.

NOTE: Upon a call for heat, the main burners will remain on for a minimum of 60 seconds.

Heating

1. Purge gas supply line of air by opening union ahead of gas valve. When gas odor is detected, tighten union and wait 5 minutes before proceeding.
2. Turn on electrical supply and open manual gas valve.
3. Set system switch selector at HEAT position and fan switch at AUTO. or ON position. Set heating temperature lever above room temperature.
4. The induced-draft motor will start.
5. After a call for heating, the main burners should light within 5 seconds. If the burners do not light, then there is a 22-second delay before another 5-second try. If the burners still do not light, the time delay is repeated. If the burners do not light within 15 minutes, there is a lockout. To reset the control, break the 24 v power to W1.
6. The evaporator-fan motor will turn on 45 seconds after the burners are ignited.
7. The evaporator-fan motor will turn off 45 seconds after the thermostat temperature is satisfied.
8. Adjust airflow to obtain a temperature rise within the range specified on the unit nameplate and in Table 1.

   NOTE: The default value for the evaporator-fan motor ON and OFF delay is 45 seconds. The Integrated Gas Unit Controller (IGC) modifies this value when abnormal limit switch cycles occur. Based upon unit operating conditions, the ON delay can be reduced to 0 seconds and the OFF delay can be extended to 180 seconds.

   When one flash of the LED (light-emitting diode) is observed, the evaporator-fan ON/OFF delay has been modified. If the limit switch trips at the start of the heating cycle during the evaporator ON delay, the time period of the ON delay for the next cycle will be 5 seconds less than the time at which the switch tripped. (Example: If the limit switch trips at 30 seconds, the evaporator-fan ON delay for the next cycle will occur at 25 seconds.) To prevent short-cycling, a 5-second reduction will only occur if a minimum of 10 minutes has elapsed since the last call for heating.

   The evaporator-fan OFF delay can also be modified. Once the call for heating has ended, there is a 10-minute period during which the modification can occur. If the limit switch trips during this period, the evaporator-fan OFF delay will increase by 15 seconds. A maximum of 9 trips can occur, extending the evaporator-fan OFF delay to 180 seconds.

   To restore the original default value, reset the power to the unit.

TO SHUT OFF UNIT — Set system selector switch at OFF position. Resetting heating selector lever below room temperature will shut unit off temporarily until space temperature falls below thermostat setting.

Table 15 — Altitude Compensation*

ELEVATION (Ft)	125,000, 180,000, AND 224,000 BTUH NOMINAL INPUT		250,000 BTUH NOMINAL INPUT	
	Natural Gas Orifice Size†	Liquid Propane Orifice Size†	Natural Gas Orifice Size†	Liquid Propane Orifice Size†
0-2,000	31	41	30	38
2,000	32	42	30	39
3,000	32	42	31	40
4,000	32	42	32	41
5,000	33	43	33	42
6,000	34	43	34	43
7,000	35	44	35	43
8,000	36	44	36	44
9,000	37	45	37	44
10,000	38	46	38	45
11,000	39	47	39	45
12,000	40	47	40	46
13,000	41	48	41	47
14,000	42	48	42	47

*As the height above sea level increases, there is less oxygen per cubic foot of air. Therefore, heat input rate should be reduced at higher altitudes.
†Orifice available through your local distributor.

Safety Relief — A soft-solder joint at the suction line Schrader port provides pressure relief under abnormal temperature and pressure conditions.

Ventilation (Continuous Fan) — Set fan and system selector switches at ON and OFF positions, respectively. Evaporator fan operates continuously to provide constant air circulation. When the evaporator-fan selector switch is turned to the OFF position, there is a 30-second delay before the fan turns off.

Operating Sequence

COOLING, UNITS WITHOUT ECONOMIZER — When thermostat calls for cooling, terminals G and Y1 are energized. The indoor (evaporator) fan contactor (IFC) and compressor contactor no. 1 (C1) are energized, and evaporator-fan motor, compressor no. 1, and condenser fan start. The condenser-fan motor runs continuously while unit is cooling. If the thermostat calls for a second stage of cooling by energizing Y2, compressor contactor no. 2 (C2) is energized and compressor no. 2 starts.

When the thermostat is satisfied, C1 and C2 are deenergized and the compressors and outdoor (condenser) fan motor (OFM) shut off. After a 30-second delay, the indoor (evaporator) fan motor (IFM) shuts off. If the thermostat fan selector switch is in the ON position, the evaporator motor will run continuously.

HEATING, UNITS WITHOUT ECONOMIZER — When the thermostat calls for heating, terminal W1 is energized. In order to prevent thermostat short-cycling, the unit is locked into the Heating mode for at least 1 minute when W1 is energized. The induced-draft motor (IDM) is then energized and the burner ignition sequence begins. The indoor (evaporator) fan motor (IFM) is energized 45 seconds after a flame is ignited. On units equipped for two stages of heat, when additional heat is needed, W2 is energized and the high-fire solenoid on the main gas valve (MGV) is energized. When the thermostat is satisfied and W1 and W2 are deenergized, the IFM stops after a 45-second time-off delay.

COOLING, UNITS WITH DURABLADE ECONOMIZER — When the outdoor-air temperature is above the OAT (outdoor-air thermostat) setting and the room thermostat calls for cooling, compressor contactor no. 1 is energized to start compressor no. 1 and the outdoor (condenser) fan motor (OFM). The indoor (evaporator) fan motor (IFM) is energized and the economizer damper moves to the minimum position. Upon a further call for cooling, compressor contactor no. 2 will be energized, starting compressor no. 2. After the thermostat is satisfied, the damper moves to the fully closed position when using an auto fan or to the minimum position when using a continuous fan.

When the outdoor-air temperature is below the OAT setting and the thermostat calls for cooling, the economizer dampers move to the minimum position. If the supply-air temperature is above 57 F, the damper continues to open until it reaches the fully open position or until the supply-air temperature drops below 52 F.

When the supply-air temperature falls to between 57 F and 52 F, the damper will remain at an intermediate open position. If the supply-air temperature falls below 52 F, the damper will modulate closed until it reaches the minimum position or until the supply-air temperature is above 52 F. When the thermostat is satisfied, the damper will move to the fully closed position when using an auto fan or to the minimum position when using a continuous fan.

If the outdoor air alone cannot satisfy the cooling requirements of the conditioned space, economizer cooling is integrated with mechanical cooling, providing second-stage cooling. Compressor no. 1 and the condenser fan will be energized and the position of the economizer damper will be determined by the supply-air temperature. Compressor no. 2 is locked out.

When the second stage of cooling is satisfied, the compressor and OFM will be deenergized. The damper position will be determined by the supply-air temperature.

After a 30-second delay, the IFM shuts off. If the thermostat fan selector switch is in the ON position, the IFM will run continuously.

COOLING UNITS WITH PARABLADE ECONOMIZER — When the outdoor air is above the enthalpy control setting, and the room thermostat calls for cooling, the compressor contactor no. 1 is energized to start compressor no. 1 and the outdoor (condenser) fan motor. The indoor (evaporator) fan motor is energized and the economizer damper moves to the minimum position. Upon further call for cooling, compressor contactor no. 2 is energized, starting compressor no. 2. After the room thermostat is satisfied the damper will spring return to the fully closed position.

When the outdoor air is below the enthalpy control setting and the thermostat calls for cooling, the economizer outdoor air damper is opened proportionally to maintain between 50 and 56 F at the mixed air sensor. If outside air alone cannot satisfy the cooling requirements, economizer cooling is integrated with mechanical cooling and the second compressor is locked out. When the room thermostat is satisfied, the damper will spring return to the fully closed position.

HEATING, UNITS WITH ECONOMIZER — When the thermostat calls for heating, terminal W1 is energized. In order to prevent thermostat short-cycling, the unit is locked into the Heating mode for at least 1 minute when W1 is energized. The induced-draft motor is then energized and the burner ignition sequence begins. The indoor (evaporator) fan motor (IFM) is energized 45 seconds after a flame is ignited and the damper moves to the minimum position. On units equipped for two stages of heat, when additional heat is needed, W2 is energized and the high-fire solenoid on the main gas valve (MGV) is energized. When the thermostat is satisfied and W1 and W2 are deenergized, the IFM stops after a 45 second time-off delay. The economizer damper then moves to the fully closed position. When using continuous fan, the damper will remain in the minimum position.

SERVICE

⚠ CAUTION

When servicing unit, shut off all electrical power to unit to avoid shock hazard or injury from rotating parts.

Cleaning — Inspect unit interior at the beginning of each heating and cooling season and as operating conditions require.

EVAPORATOR COIL — Clean coil as required. Inspect coil at beginning of heating and cooling seasons.

1. Turn unit power off. Remove evaporator coil access panel.
2. If economizer is installed, remove economizer by disconnecting Molex plug and removing economizer mounting screws. Refer to Accessory Economizer Installation Instructions or Optional Economizer sections on pages 12 and 15 for more details.
3. Slide filters out of unit.
4. Clean coil using a commercial coil cleaner or dishwasher detergent in a pressurized spray canister. Wash both sides of coil and flush with clean water. For best results, backflush toward return-air section to remove foreign material.
5. Flush condensate pan after completion.
6. Reinstall economizer and filters.
7. Reconnect wiring.
8. Replace access panels.

CONDENSER COIL — Inspect coil monthly. Clean condenser coil annually, and as required by location and outdoor-air conditions.

One-Row Coils — Wash coil with commercial cleaner. Clean outer surfaces with a stiff brush in the normal manner. It is not necessary to remove top panel.

2-Row Coils — Clean coil as follows:

1. Turn off unit power.
2. Remove top panel screws on condenser end of unit.
3. Remove condenser coil corner post. See Fig. 37. To hold top panel open, place coil corner post between top panel and center post. See Fig. 38.
4. Remove screws securing coil to center post.
5. Remove fastener holding coil sections together at return end of condenser coil. Carefully separate the outer coil section 3 to 4 in. from the inner coil section. See Fig. 39.
6. Use a water hose or other suitable equipment to flush down between the 2 coil sections to remove dirt and debris. Clean the outer surfaces with a stiff brush in the normal manner.
7. Secure inner and outer coil rows together with a field-supplied fastener.
8. Reposition the outer coil section and remove the coil corner post from between the top panel and center post.
9. Reinstall the coil corner post and replace all screws.

CONDENSATE DRAIN — Check and clean each year at start of cooling season. In winter, keep drain dry or protect against freeze-up.

FILTERS — Clean or replace at start of each heating and cooling season, or more often if operating conditions require it. Replacement filters must be same dimensions as original filters.

Lubrication

COMPRESSORS — Each compressor is charged with the correct amount of oil at the factory.

FAN-MOTOR BEARINGS — *Fan-motor bearings are of the permanently lubricated type. No further lubrication is required.* No lubrication of condenser- or evaporator-fan motors is required.

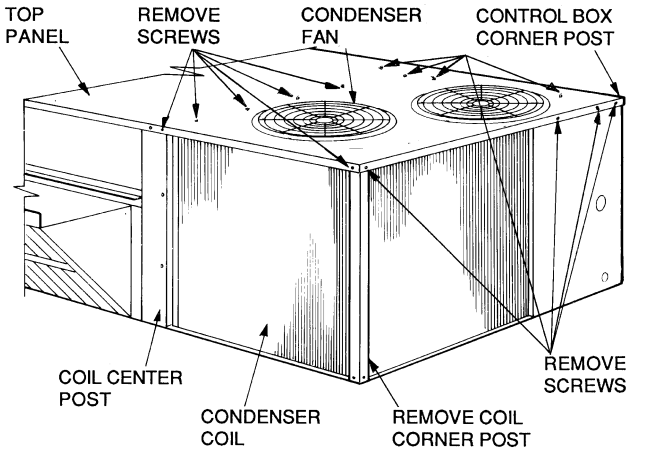


Fig. 37 — Cleaning Condenser Coil

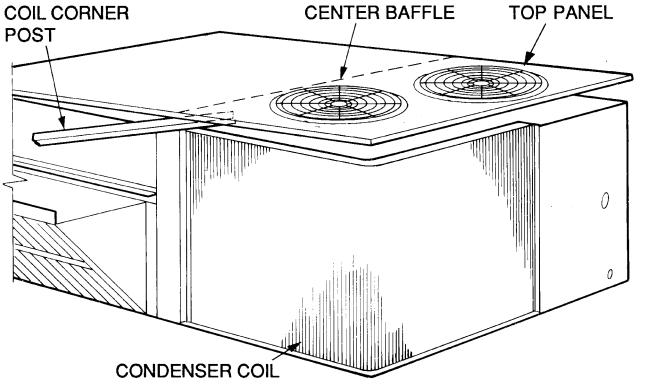


Fig. 38 — Propping Up Top Panel

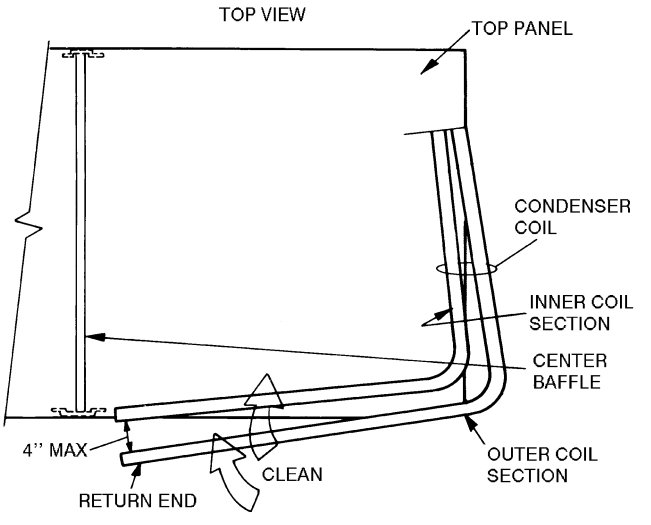
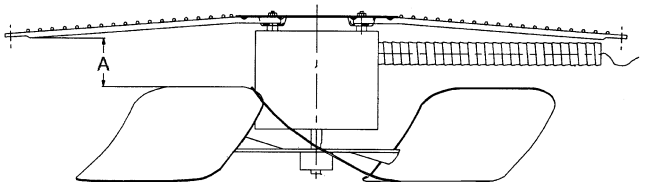


Fig. 39 — Separating Coil Sections

Condenser-Fan Adjustment (Fig. 40)

1. Shut off unit power supply.
2. Remove condenser-fan assembly (grille, motor, motor cover, and fan) and loosen fan hub setscrews.
3. Adjust fan height as shown in Fig. 40.
4. Tighten setscrews and replace condenser-fan assembly.



48TJ UNIT VOLTAGE	FAN HEIGHT "A" (in.)
208/230 V	2.75
460 V and 575 V	3.50

Fig. 40 — Condenser-Fan Adjustment

Manual Outdoor-Air Damper — If outdoor-air damper blade is required, see Manual Outdoor-Air Damper section on page 11.

Economizer Adjustment — Refer to Optional Economizer sections on pages 12 and 15.

Condenser Coil Grille — Condenser coil grille is shipped factory-installed. No adjustments are required.

Refrigerant Charge — Amount of refrigerant charge is listed on unit nameplate (also refer to Table 1). Refer to Carrier GTAC 2-5 Charging, Recovery, Recycling, and Reclamation training manual and the following procedures.

Unit panels must be in place when unit is operating during charging procedure.

NO CHARGE — Use standard evacuating techniques. After evacuating system, weigh in the specified amount of refrigerant (refer to Table 1).

LOW CHARGE COOLING — Using Cooling Charging Charts, Fig. 41-44, vary refrigerant until the conditions of the appropriate chart are met. Note the charging charts are different from the type normally used. The charts are based on charging the units to the correct superheat for the various operating conditions. Accurate pressure gage and temperature sensing device are required. Connect the pressure gage to the service port on the suction line. Mount the temperature sensing device on the suction line and insulate it so that outdoor ambient temperature does not affect the reading. Indoor-air cfm must be within the normal operating range of the unit.

TO USE COOLING CHARGING CHART — Take the outdoor ambient temperature and read the suction pressure gage. Refer to appropriate chart to determine what suction temperature should be. If suction temperature is high, add refrigerant. If suction temperature is low, carefully recover some of the charge. Recheck the suction pressure as charge is adjusted. Example (Fig. 44, Circuit 2):

Outdoor Temperature . . . . . 85 F
Suction Pressure . . . . . 74 psig
Suction Temperature should be . . . . . 56 F
(Suction temperature may vary ± 5 F.)

If Chargemaster® charging device is used, temperature and pressure readings must be accomplished using the charging charts.

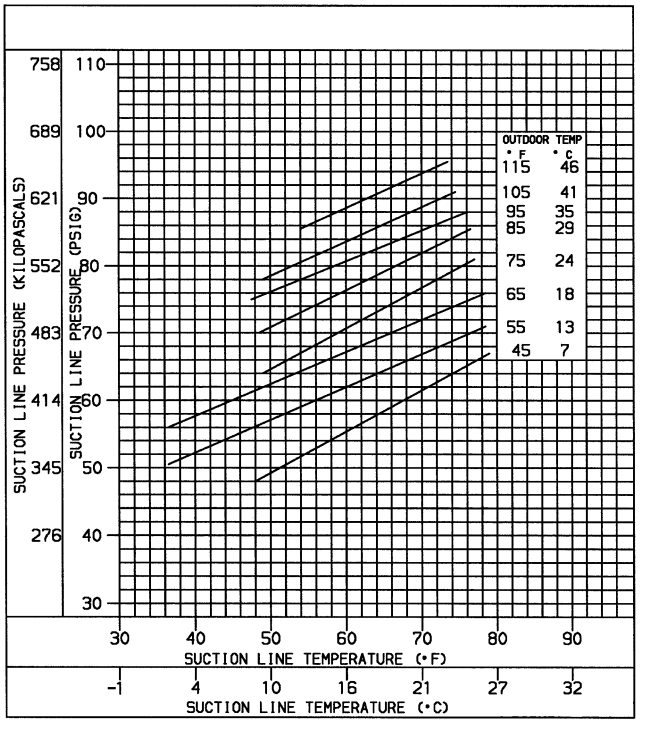


Fig. 41 — Cooling Charging Chart; 48TJ008

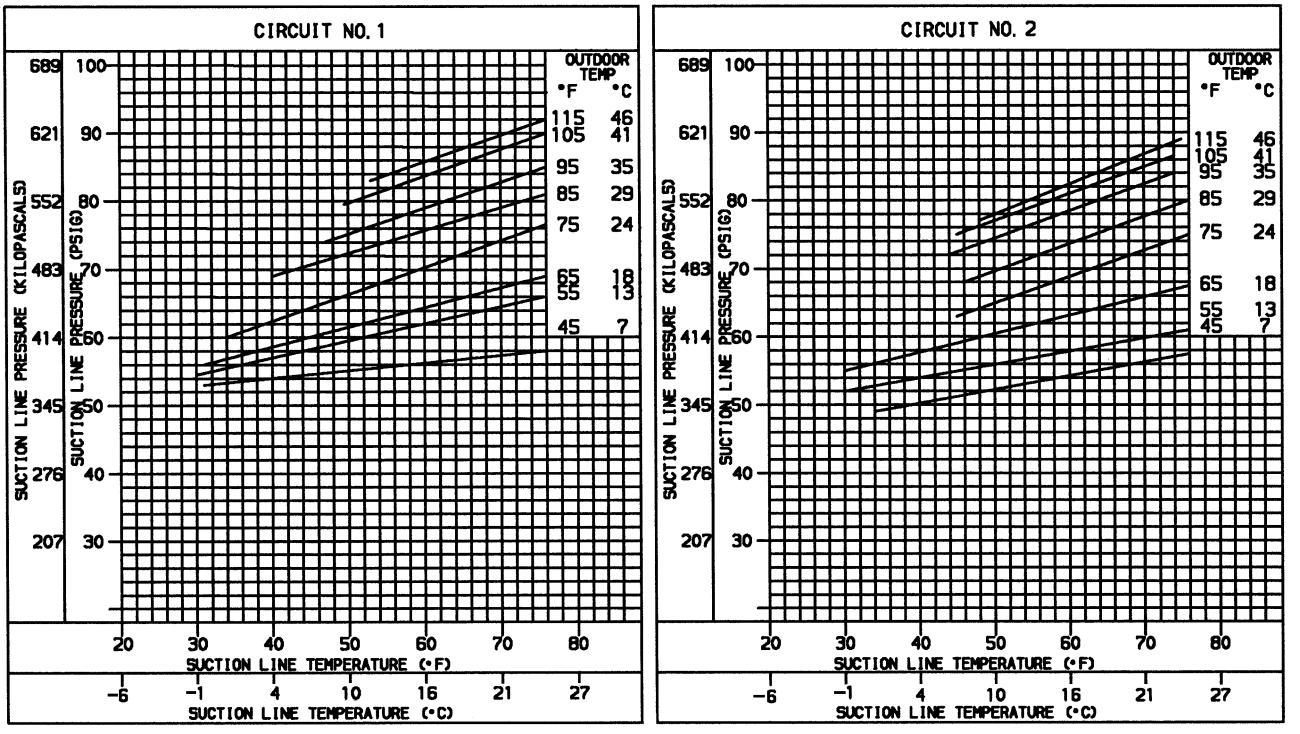


Fig. 42 — Cooling Charging Chart; 48TJ009

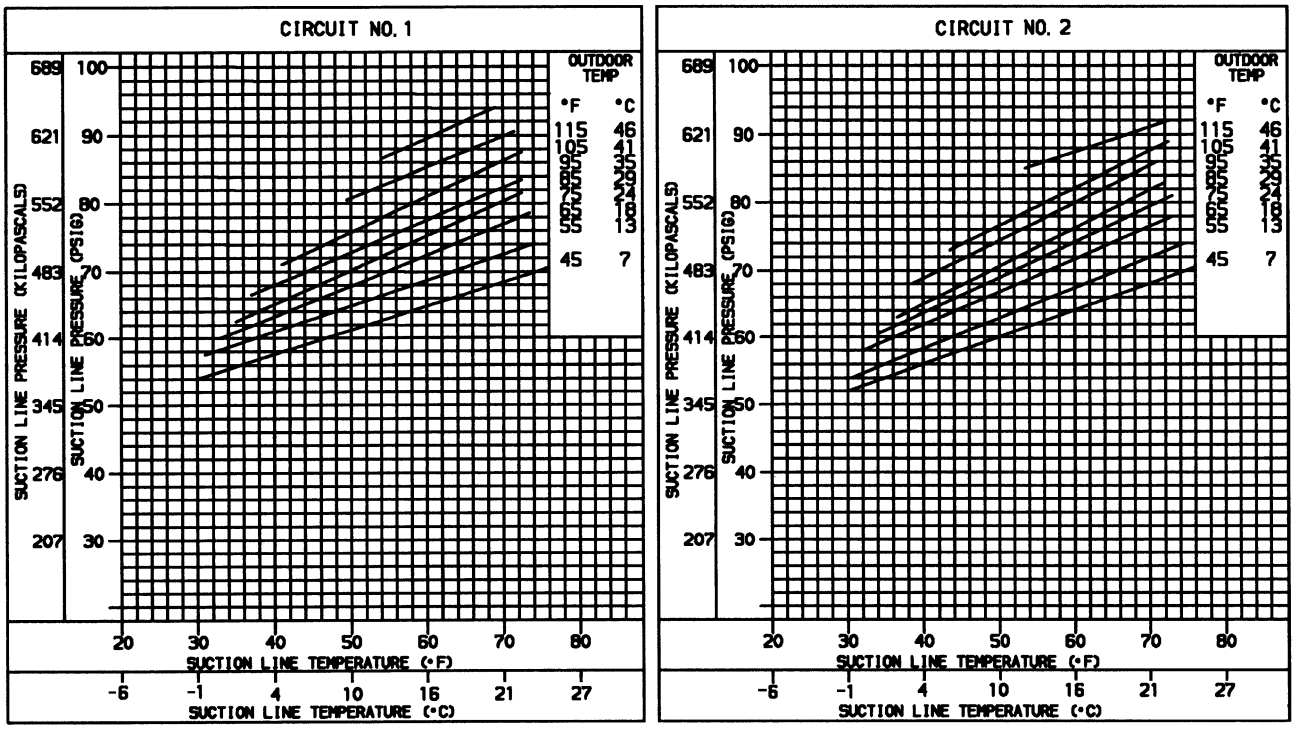


Fig. 43 — Cooling Charging Chart; 48TJ012

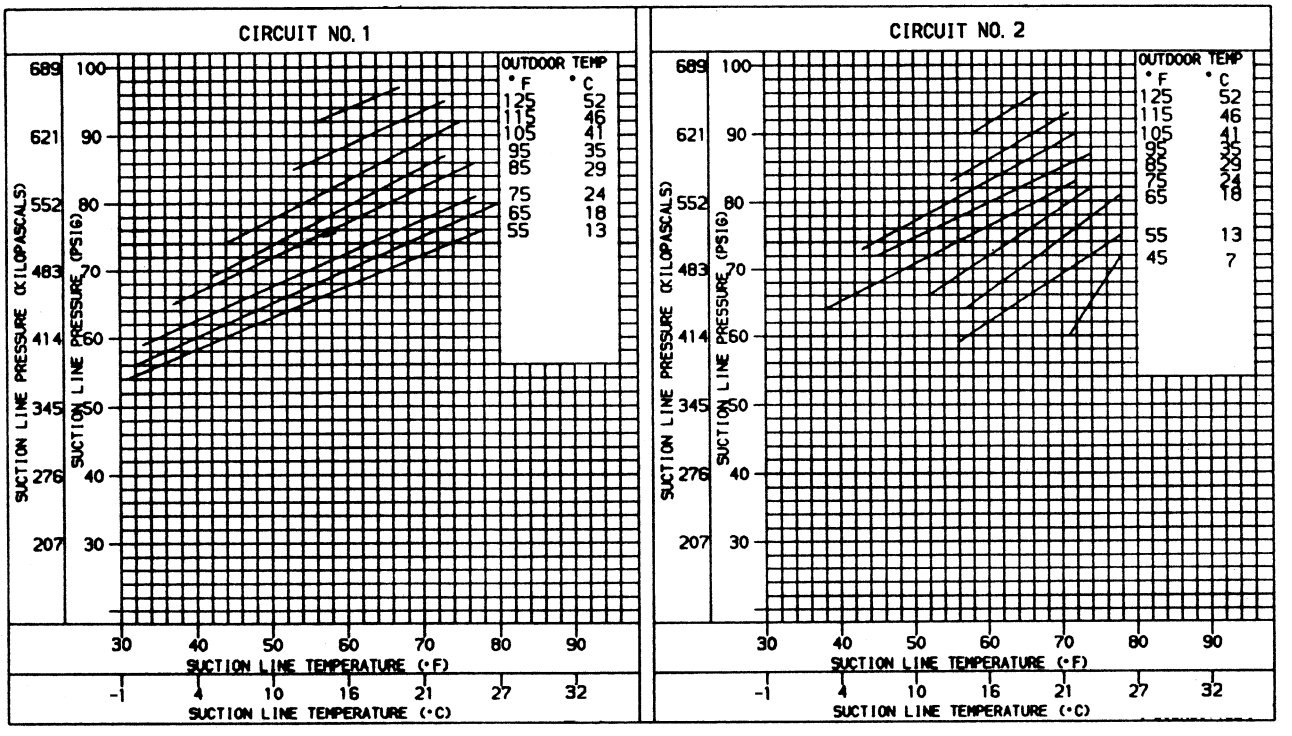


Fig. 44 — Cooling Charging Chart; 48TJ014

Flue Gas Passageways — To inspect the flue collector box and upper areas of the heat exchanger:

1. Remove the combustion blower wheel and motor assembly according to directions in Combustion-Air Blower section below.
2. Remove the flue cover to inspect the heat exchanger.
3. Clean all surfaces as required using a wire brush.

Combustion-Air Blower — Clean periodically to assure proper airflow and heating efficiency. Inspect blower wheel every fall and periodically during heating season. For the first heating season, inspect blower wheel bimonthly to determine proper cleaning frequency.

To inspect blower wheel, shine a flashlight into drafthood opening. If cleaning is required, remove motor and wheel as follows:

1. Slide burner access panel out.
2. Remove the 6 screws that attach induced-draft motor housing to vestibule plate (Fig. 45).
3. The blower wheel can be cleaned at this point. If additional cleaning is required, continue with Steps 4 and 5.
4. To remove blower from the motor shaft, remove 2 setscrews.
5. To remove motor, remove the 4 screws that hold blower housing to mounting plate. Remove the motor cooling fan by removing one setscrew. Then remove nuts that hold motor to mounting plate.
6. To reinstall, reverse the procedure outlined above.

Limit Switch — Remove blower access panel (Fig. 7). Limit switch is located on the fan deck.

Burner Ignition — Unit is equipped with a direct spark ignition 100% lockout system. Integrated Gas Unit Controller (IGC) is located in the control box (Fig. 12). Module contains a self-diagnostic LED. A single LED on the IGC provides a visual display of operational or sequential problems when the power supply is interrupted. When a break in power occurs, the module will be reset (resulting in a loss of fault history) and the indoor (evaporator) fan ON/OFF times will be reset. For additional information, refer to the Start-Up, Heating section on page 23. The LED error code can be observed through the viewport. See Fig. 12. During servicing refer to the label on the control box cover or Table 16 for an explanation of LED error code descriptions.

If lockout occurs, unit may be adjusted by interrupting power supply to unit for at least 5 seconds.

Table 16 — LED Error Code Description*

LED INDICATION	ERROR CODE DESCRIPTION
ON	Normal Operation
OFF	Hardware Failure
1 Flash†	Evaporator Fan On/Off Delay Modified
2 Flashes	Limit Switch Fault
3 Flashes	Flame Sense Fault
4 Flashes	4 Consecutive Limit Switch Faults
5 Flashes	Ignition Lockout Fault
6 Flashes	Induced-Draft Motor Fault
7 Flashes	Rollout Switch Fault
8 Flashes	Internal Control Fault

LED — Light-Emitting Diode

*A 3-second pause exists between LED error code flashes. If more than one error code exists, all applicable codes will be displayed in numerical sequence.

†Indicates a code that is not an error. The unit will continue to operate when this code is displayed.

IMPORTANT: Refer to Troubleshooting Tables 17-21 for additional information.

Main Burners — At the beginning of each heating season, inspect for deterioration or blockage due to corrosion or other causes. Observe the main burner flames and adjust if necessary.

⚠ CAUTION

When working on gas train, do not hit or plug orifice spuds.

REMOVAL AND REPLACEMENT OF GAS TRAIN (Fig. 45 and 46)

1. Shut off manual gas valve.
2. Shut off power to unit.
3. Slide out burner section side panel (not shown).
4. Disconnect gas piping at unit gas valve.
5. Remove wires connected to gas valve. Mark each wire.
6. Remove wires from ignitor and sensor wires at the Integrated Gas Unit Controller (IGC).
7. Remove the 2 screws that attach the burner rack to the vestibule plate.
8. Slide the burner tray out of the unit (Fig. 46).
9. To reinstall, reverse the procedure outlined above.

CLEANING AND ADJUSTMENT

1. Remove burner rack from unit as described in Removal and Replacement of Gas Train section, above.
2. Inspect burners; if dirty, remove burners from rack.
3. Using a soft brush, clean burners and cross-over port as required.
4. Adjust spark gap. See Fig. 47.
5. Reinstall burners on rack.
6. Reinstall burner rack as described in Removal and Replacement of Gas Train section, this page.

Replacement Parts — A complete list of replacement parts may be obtained from any Carrier distributor upon request.

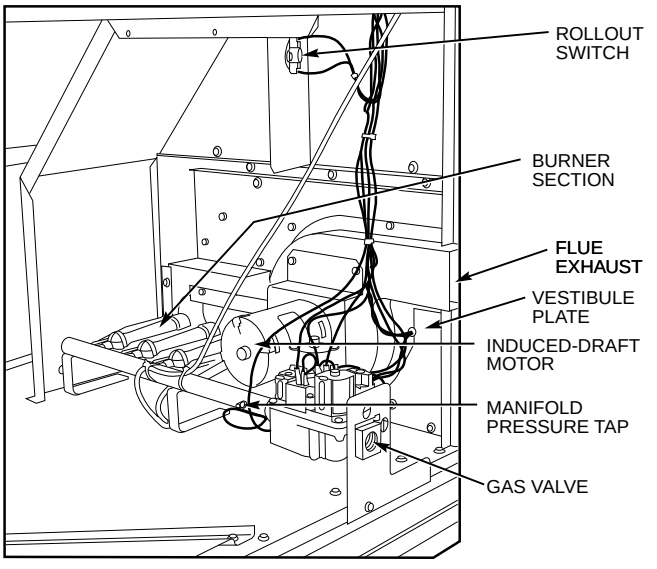


Fig. 45 — Burner Section Details

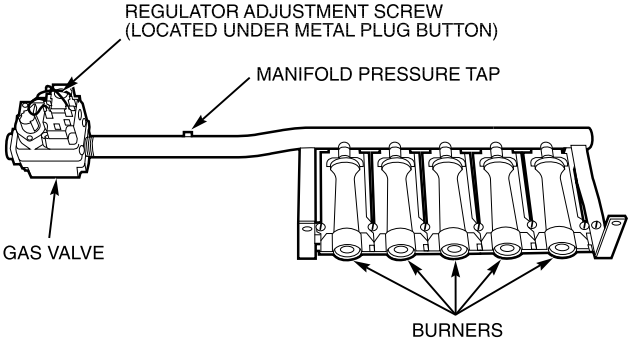
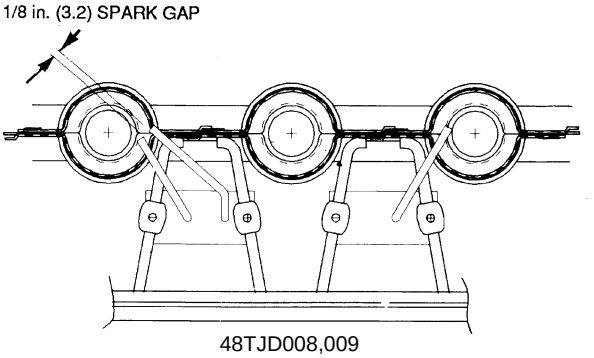
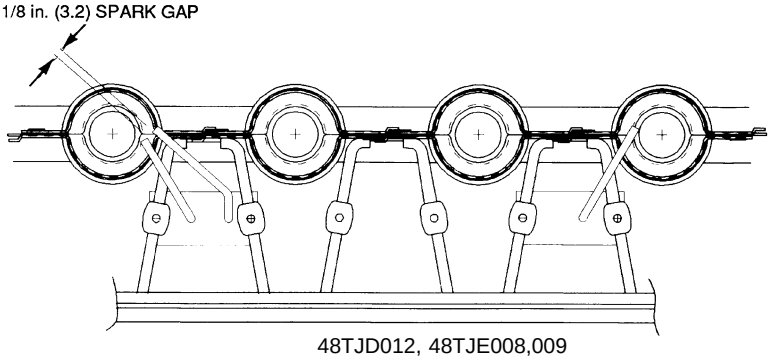


Fig. 46 — Burner Tray Details



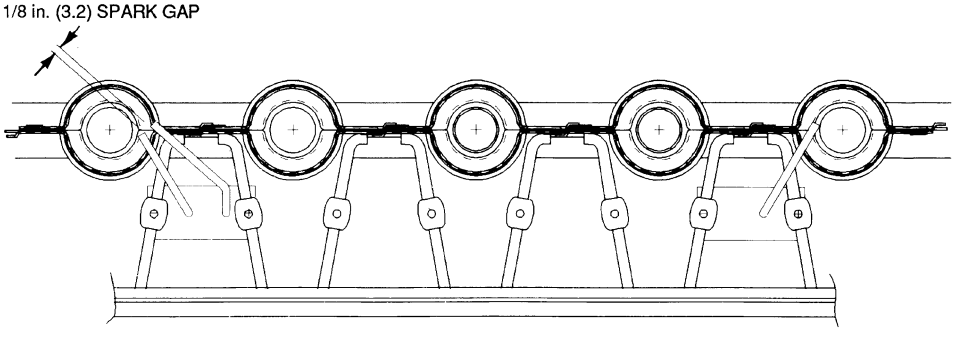
125,000 BTUH INPUT

48TJD008,009



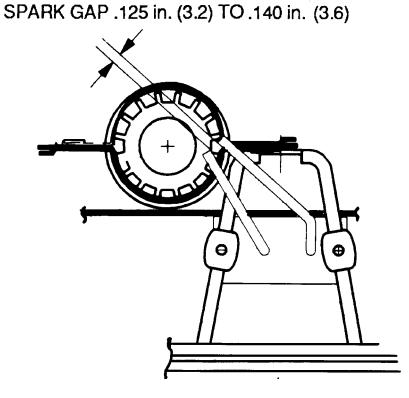
120,000-180,000 BTUH INPUT

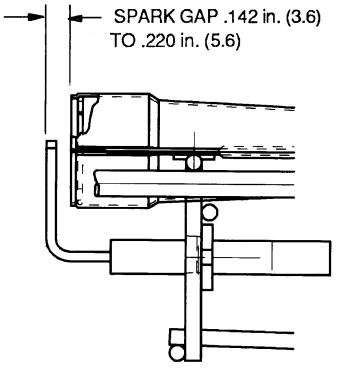
48TJD012, 48TJE008,009



180,000-224,000 BTUH INPUT
200,000-250,000 BTUH INPUT

48TJD014; 48TJE012
48TJF008,009
48TJE014; 48TJF012





NOTE: Dimensions in ( ) are millimeters.

Fig. 47 — Spark Gap Adjustment

Table 17 — LED Error Code Service Analysis

PROBLEM	CAUSE	REMEDY
Hardware failure. (LED OFF)	Loss of power to control module (IGC).	Check 5-amp fuse on IGC, power to unit, 24-v circuit breaker, and transformer. Units without a 24-v circuit breaker have an internal overload in the 24-v transformer. If the overload trips, allow 10 minutes for automatic reset.
Limit switch fault. (LED 2 flashes)	High temperature limit switch is open.	Check the operation of the indoor (evaporator) fan motor. Ensure that the supply-air temperature rise is in accordance with the range on the unit nameplate.
Flame sense fault. (LED 3 flashes)	The IGC sensed flame that should not be present.	Reset unit. If problem persists, replace control board.
4 consecutive limit switch trips. (LED 4 flashes)	Inadequate airflow to unit.	Check operation of indoor (evaporator) fan motor and that supply-air temperature rise agrees with range on unit nameplate information.
Ignition lockout. (LED 5 flashes)	Unit unsuccessfully attempted ignition for 15 minutes.	Check ignitor and flame sensor electrode spacing, gaps, etc. Ensure that flame sense and ignition wires are properly terminated. Verify that unit is obtaining proper amount of gas.
Induced-draft motor fault. (LED 6 flashes)	IGC does not sense that induced-draft motor is operating.	Check for proper voltage. If motor is operating, check the speed sensor plug/IGC Terminal J2 connection. Proper connection: PIN 1 — White, PIN 2 — Red, PIN 3 — Black.
Rollout switch fault. (LED 7 flashes)	Rollout switch has opened.	Rollout switch will automatically reset, but IGC will continue to lock out unit. Check gas valve operation. Ensure that induced-draft blower wheel is properly secured to motor shaft. Reset unit at unit disconnect.
Internal control fault. (LED 8 flashes)	Microprocessor has sensed an error in the software or hardware.	If error code is not cleared by resetting unit power, replace the IGC.

LEGEND

IGC — Integrated Gas Unit Controller
LED — Light-Emitting Diode

⚠ WARNING

If the IGC must be replaced, be sure to ground yourself to dissipate any electrical charge that may be present before handling new control board. The IGC is sensitive to static electricity and may be damaged if the necessary precautions are not taken.

IMPORTANT: Refer to Table 21 — Heating Service Troubleshooting for additional troubleshooting information.

Table 18 — Durablade Economizer Troubleshooting

PROBLEM	CAUSE	REMEDY
Damper does not open.	Indoor (evaporator) fan is off.	1. Check to ensure that 24 vac is present at terminal C1 on the IFC or that 24 vac is present at the IFO terminal. Check whether 24 vac is present at PL6-1 (red wire) and/or PL6-3 (black wire). If 24 vac is not present, check wiring (see unit label diagram). 2. Check proper thermostat connection to G on the connection board.
	No power to economizer motor.	1. Check that SW3 is properly making contact with the damper blade. Check that SW1 is in the NC (normally closed) position. 2. Check diode D1. If diode is not functioning properly, replace D1. 3. Confirm that the economizer control board is grounded properly at PL6-4 (brown wire) and at brown terminal of the economizer control board (brown wire). The economizer motor must also be grounded properly at the negative motor terminal (brown wire). 4. Verify SW1 and SW3 are working and wired properly (see unit label diagram). 5. Check for 24 vac input at both PL6-1 (red wire) and PL6-3 (black wire). If 24 vac not present, check unit wiring (see unit label diagram). If 24 vac is found in both places, check for 24 vac at the yellow terminal of the economizer control board (yellow wire). If 24 vac power is not present, replace the economizer control board.
	Economizer motor failure.	If the indoor (evaporator) fan and economizer motor are energized, verify that there is a minimum of 18 vdc at the positive motor terminal. If the motor is not operating, replace the motor.
Economizer operation limited to minimum position.	OAT or EC set too high.	1. Set at correct temperature (3 F below indoor space temperature). 2. Check OAT or EC by setting above outdoor temperature or humidity level. If the OAT or EC switches do not close, replace OAT or EC.
	Verify economizer control board is correctly wired and works properly.	1. Perform the following tests when OAT or EC is closed, Y1 is called for and damper is at minimum position. Confirm 24 vac on gray terminal of the economizer control board (gray wire). If 24 vac is not present, check wiring (see unit label diagram). 2. Verify that SW1 and SW3 are wired correctly and working properly (see unit label diagram). 3. Check to ensure that 24 vac exists at PL6-2 (blue wire). If 24 vac is not present, check wiring (see unit wiring label diagram). 4. Check 24 vac output at PL6-10 (white wire). If 24 vac is not present, replace economizer control board.
	Check SAT.	1. After verifying that the OAT and EC settings and the economizer control board wiring are correct, check to ensure that the 24 vac terminal of the SAT has 24 vac (white wire). If OAT, EC, and control board are functioning and wired properly and no 24 vac exists, check wiring (see unit label diagram). 2. If supply-air temperature is greater than 57 F, 24 vac should be found at terminal T2 on the SAT (pink wire). If 24 vac is not present, replace SAT.
Damper does not close.	Incorrect wiring of economizer.	1. Verify that SW2 and SW4 are wired and working properly (see unit label diagram). 2. Check diode D2. If diode is not functioning properly, replace D2.
	Verify economizer control board is functioning properly.	1. After verifying that the wiring is correct, modulate the damper to the minimum position. Remove the call for G (evaporator fan). 2. If the damper does not move, check for 24 vac at PL6-1 (red wire). If 24 vac is not present, check wiring (see unit label diagram). 3. If damper still does not move, check for 24 vac at blue terminal of economizer control board (blue wire). If 24 vac is not present, replace the economizer circuit board.
	Check SAT.	1. After verifying that the wiring is correct and the economizer control board is functioning properly, place the OAT or EC switch in the closed position. Place a call for Y1 and open the damper to the fully open position. Confirm that the 24 vac terminal of the SAT has 24 vac (white wire). If 24 vac is not present, check wiring (see unit label diagram). 2. If supply-air temperature is less than 52 F, 24 vac should be found at terminal T1 on the SAT (violet wire). If 24 vac not found, replace SAT.
	Economizer motor failure.	If economizer control board and SAT are functioning properly, verify that there is a minimum of 18 vdc at the positive motor terminal. If a minimum if 18 vdc is present and the motor is still not operating, replace the motor.
Economizer damper does not close on power loss.	Verify that close-on-power-loss and economizer control board are functioning properly.	1. Check voltage potential across batteries. If lower than 14 vdc, replace close-on-power-loss power supply (9-v alkaline batteries). It is recommended that you check this emergency power supply on a regular basis or whenever the filters are changed. 2. If the close-on-power-loss and economizer control board are functioning properly, check for 14 vdc or higher at the blue terminal of the economizer control board (blue wire) when power is disconnected from unit. If 14 vdc is not present, replace the control board.

LEGEND

C1 — Common Power
EC — Enthalpy Control
IFC — Indoor (Evaporator) Fan Contactor
IFO — Indoor (Evaporator) Fan On
OAT — Outdoor-Air Thermostat
PL — Plug
SAT — Supply-Air Thermostat
SW — Economizer Position Switch

Table 19 — PARABLADE Economizer Service Troubleshooting

PROBLEM	CAUSE	REMEDY
Damper does not open.	Evaporator fan not on.	Check wiring between G on connection board and indoor (evaporator) fan contactor.
	No power to economizer motor.	1. Disconnect power at TR and TR1. Disconnect jumper across P and P1. 2. Connect jumper across TR and 1. 3. Connect jumper across T1 and T. 4. If connected, remove enthalpy sensor from terminals S_o and +. Factory-installed 620 ohm resistor should be connected to terminals S_R and +. 5. Apply power (24 vac) to terminals TR and TR1. The LED should be off and the damper should be in the closed position. 6. Disconnect the factory-installed 620 ohm resistor from terminals S_R and +. The LED should light up and the motor should drive towards open. If this does not happen, replace the economizer control module.
	Economizer motor failure.	If the indoor (evaporator) fan and economizer motor are energized, verify that there is a minimum of 24 vac at terminals TR and TR1. If the motor is not operating, replace the motor.
Economizer operation limited to minimum position.	Economizer control module failure.	1. To simulate high or low enthalpy, reconnect the factory-installed 620 ohm resistor across terminals S_R and +. 2. Connect 1.2 Kohm checkout resistor across terminals S_o and +. Turn the enthalpy set point to ''A.'' The LED should turn on, indicating low enthalpy. The motor should drive towards open. If LED does not light, replace module. If motor does not drive open, check motor operation. 3. Turn the enthalpy set point to ''D.'' The LED should turn off, indicating high enthalpy. The motor should drive towards closed. If these actions do not occur, replace module. 4. Disconnect 1.2 Kohm checkout resistor before resuming operation.
Damper does not close.	No power to economizer.	1. Disconnect power at TR and TR1. Disconnect jumper across P and P1. 2. Connect jumper across TR and 1. 3. Connect jumper across T1 and T. 4. If connected, remove enthalpy sensor from terminals S_o and +. Factory-installed 620 ohm resistor should be connected to terminals S_R and +. 5. Apply power (24 vac) to terminals TR and TR1. The LED should be off and the damper should be in the closed position. 6. Disconnect the factory-installed 620 ohm resistor from terminals S_R and +. The LED should light up and the motor should drive towards open. If this does not happen, replace the economizer control module.
	Spring return failure.	If power to unit is off and damper does not close, check for a bound linkage. If linkage is not bound, then internal spring may be broken. Replace actuator.
	Economizer motor failure.	If the economizer control module is functioning properly, verify that there is a minimum of 24 vac at terminals TR and TR1. If the motor is not operating, replace the motor.
Damper does not open or close according to enthalpy readings.	Sensor incorrectly wired or bad.	To verify sensor operation, reconnect the + lead of the outdoor enthalpy sensor to the + terminal of the economizer control module. Connect a DC milliammeter between terminals S_o of the economizer control module and terminal S of the enthalpy sensor. The milliammeter should indicate between 3 and 25 mA if the sensor is operating properly. If the milliammeter indicates 0, the sensor may be wired backwards. If any other readings are shown, replace the sensor.

LEGEND

LED — Light-Emitting Diode

Table 20 — Cooling Service Troubleshooting

PROBLEM	CAUSE	REMEDY
Compressor and condenser fan will not start.	Power failure.	Call power company.
	Fuse blown or circuit breaker tripped.	Replace fuse or reset circuit breaker.
	Defective thermostat, contactor, transformer, or control relay.	Replace component.
	Insufficient line voltage.	Determine cause and correct.
	Incorrect or faulty wiring.	Check wiring diagram and rewire correctly.
	Thermostat setting too high.	Lower thermostat setting below room temperature.
Compressor will not start but condenser fan runs.	Faulty wiring or loose connections in compressor circuit.	Check wiring and repair or replace.
	Compressor motor burned out, seized, or internal overload open.	Determine cause. Replace compressor.
	Defective run/start capacitor, overload, or start relay.	Determine cause and replace.
	One leg of 3-phase power dead.	Replace fuse or reset circuit breaker. Determine cause.
Compressor cycles (other than normally satisfying thermostat).	Refrigerant overcharge or undercharge.	Recover refrigerant, evacuate system, and recharge to nameplate.
	Defective compressor.	Replace and determine cause.
	Insufficient line voltage.	Determine cause and correct.
	Blocked condenser.	Determine cause and correct.
	Defective run/start capacitor, overload, or start relay.	Determine cause and replace.
	Defective thermostat.	Replace thermostat.
	Faulty condenser-fan motor or capacitor.	Replace.
	Restriction in refrigerant system.	Locate restriction and remove.
Compressor makes excessive noise (48TJ014 scroll only)	Compressor rotating in wrong direction.	Reverse the 3-phase power leads as described on page 23.
Compressor operates continuously.	Dirty air filter.	Replace filter.
	Unit undersized for load.	Decrease load or increase unit size.
	Thermostat set too low.	Reset thermostat.
	Low refrigerant charge.	Locate leak, repair, and recharge.
	Leaking valves in compressor.	Replace compressor.
	Air in system.	Recover refrigerant, evacuate system, and recharge.
	Condenser coil dirty or restricted.	Clean coil or remove restriction.
Excessive head pressure.	Dirty air filter.	Replace filter.
	Dirty condenser coil.	Clean coil.
	Refrigerant overcharged.	Remove excess refrigerant.
	Air in system.	Recover refrigerant, evacuate system, and recharge.
	Condenser air restricted or air short-cycling.	Determine cause and correct.
Head pressure too low.	Low refrigerant charge.	Check for leaks, repair, and recharge.
	Compressor valves leaking.	Replace compressor.
	Restriction in liquid tube.	Remove restriction.
Excessive suction pressure.	High heat load.	Check for source and eliminate.
	Compressor valves leaking.	Replace compressor.
	Refrigerant overcharged.	Recover excess refrigerant.
Suction pressure too low.	Dirty air filter.	Replace filter.
	Low refrigerant charge.	Check for leaks, repair, and recharge.
	Metering device or low side restricted.	Remove source of restriction.
	Insufficient evaporator airflow.	Increase air quantity. Check filter and replace if necessary.
	Temperature too low in conditioned area.	Reset thermostat.
	Field-installed filter drier restricted.	Replace.
Compressor no. 2 will not run.	Unit in economizer mode.	Proper operation; no remedy necessary.

Table 21 — Heating Service Troubleshooting

PROBLEM	CAUSE	REMEDY
Burners will not ignite.	Misaligned spark electrodes.	Check flame ignition and sensor electrode positioning. Adjust as needed.
	No gas at main burners.	Check gas line for air purge as necessary. After purging gas line of air, allow gas to dissipate for at least 5 minutes before attempting to relight unit.
		Check gas valve.
	Water in gas line.	Drain water and install drip leg to trap water.
	No power to furnace.	Check power supply, fuses, wiring, and circuit breaker.
	No 24 v power supply to control circuit.	Check transformer. Transformers with internal overcurrent protection require a cool down period before resetting.
	Miswired or loose connections	Check all wiring and wirenut connections.
	Burned-out heat anticipator in thermostat.	Replace thermostat.
	Broken thermostat wires.	Run continuity check. Replace wires, if necessary.
Inadequate heating.	Dirty air filter.	Clean or replace filter as necessary.
	Gas input to unit too low.	Check gas pressure at manifold. Clock gas meter for input. If too low, increase manifold pressure, or replace with correct orifices.
	Unit undersized for application.	Replace with proper unit or add additional unit.
	Restricted airflow.	Clean filter, replace filter, or remove any restrictions.
	Blower speed too low.	Use high speed tap, increase fan speed, or install optional blower, as suitable for individual units.
	Limit switch cycles main burners.	Check rotation of blower, thermostat heat anticipator settings, and temperature rise of unit. Adjust as needed.
	Too much outdoor air.	Adjust minimum position.
		Check economizer operation.
Poor flame characteristics.	Incomplete combustion (lack of combustion air) results in: Aldehyde odors, CO, sooting flame, or floating flame.	Check all screws around flue outlets and burner compartment. Tighten as necessary.
		Cracked heat exchanger.
		Overfired unit — reduce input, change orifices, or adjust gas line or manifold pressure.
		Check vent for restriction. Clean as necessary.
		Check orifice to burner alignment.
Burners will not turn off.	Unit is locked into Heating mode for a one minute minimum.	Wait until mandatory one minute time period has elapsed or power to unit.

LEGEND AND NOTES FOR FIG. 48

IMPORTANT: Refer to unit wiring label for actual unit wiring information.

AHA — Adjustable Heat Anticipator
BR — Burner Relay
C — Contactor, Compressor
CAP — Capacitor
CB — Circuit Breaker
CC — Cooling Compensator
COMP — Compressor Motor
CR — Control Relay
D — Diode
EC — Enthalpy Control
EPS — Economizer Pressure Switch
EQUIP — Equipment
FPT — Freeze-Protection Thermostat
GND — Ground
GVR — Gas Valve Relay
HPS — High-Pressure Switch
HS — Hall Effect Sensor
I — Ignitor
IDM — Induced-Draft Motor
IFC — Indoor (Evaporator) Fan Contactor
IFM — Indoor (Evaporator) Fan Motor
IGC — Integrated Gas Unit Controller
LED — Light Emitting Diode
LPS — Low-Pressure/Loss-of-Charge Switch
LS — Limit Switch
MGV — Main Gas Valve
MTR — Motor
OAT — Outdoor Air Thermostat
OFM — Outdoor-Fan Motor
PL — Plug Assembly
QT — Quadruple Terminal
R — Relay
RS — Rollout Switch
SAT — Supply Air Thermostat
SEN — Sensor
TC — Thermostat-Cooling
TH — Thermostat-Heating
TRAN — Transformer

Field Splice

Marked Wire

Terminal (Marked)

Terminal (Unmarked)

Terminal Block

Splice

Splice (Marked)

Factory Wiring

Field Control Wiring

Field Power Wiring

Accessory or Optional Wiring

To indicate common potential only, not to represent wiring

NOTES:
1. If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
2. Three-phase motors are protected under primary single phasing conditions.
3. Thermostat: HH07AT170, 172, 174 and P272-2783
   Subbase: HH93AZ176, 178 and P272-1882, 1883
4. Set heat anticipator for first stage at 0.14 amp, second stage at 0.2 amp.
5. Use copper conductors only.
6. TRAN is wired for 230 v unit. If unit is to be run with 208 v power supply, disconnect BLK wire from 230 v tap (RED) and connect to 200 v tap (BLU). Insulate end of 230 v tap.
7. When economizer assembly is installed move GRA wire from connection board (Y1) to GRA wire from PL6,5; move ORN wire from connection board (Y2) to ORN wire from PL6,9, on economizer assembly.

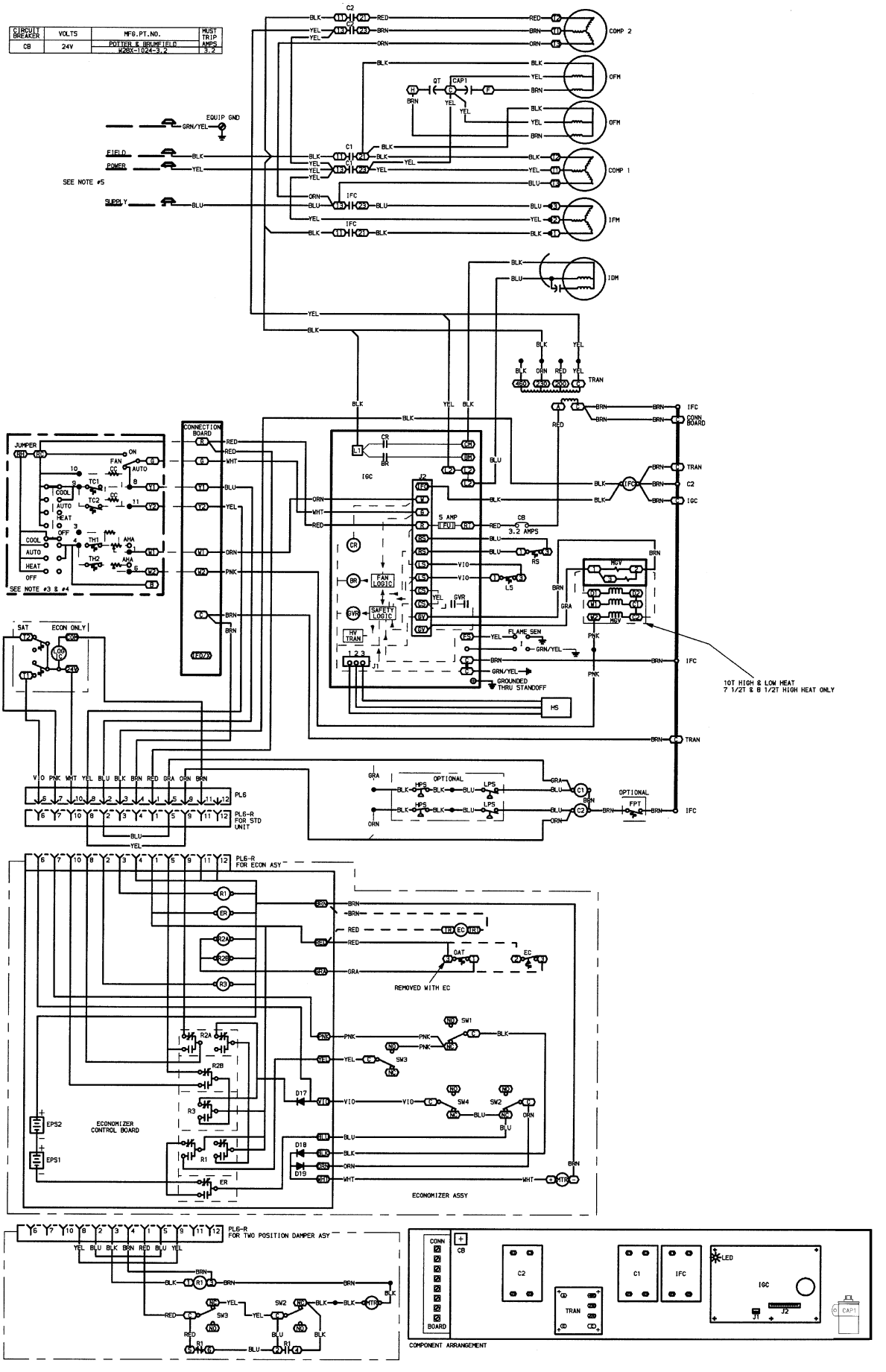


Fig. 48 — Typical Wiring Schematic and Component Arrangement

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Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

START-UP CHECKLIST
(Remove and Store in Job File)

I. PRELIMINARY INFORMATION

MODEL NO.: _____ SERIAL NO.: _____

DATE: _____ TECHNICIAN: _____

II. PRE-START-UP (insert checkmark in box as each item is completed)

☐ VERIFY THAT ALL PACKING MATERIALS HAVE BEEN REMOVED FROM UNIT

☐ REMOVE SHIPPING TIE DOWN BANDS ON COMPRESSOR (SIZE 014 ONLY) PER INSTALLATION INSTRUCTIONS

☐ VERIFY THAT CONDENSATE CONNECTION IS INSTALLED PER INSTALLATION INSTRUCTIONS

☐ CHECK ALL ELECTRICAL CONNECTIONS AND TERMINALS FOR TIGHTNESS

☐ CHECK GAS PIPING FOR LEAKS

☐ CHECK THAT INDOOR-AIR FILTERS ARE CLEAN AND IN PLACE

☐ VERIFY THAT UNIT INSTALLATION IS LEVEL

☐ CHECK FAN WHEELS AND PROPELLERS FOR LOCATION IN HOUSING/ORIFICE AND SETSCREW TIGHTNESS

III. START-UP

ELECTRICAL

SUPPLY VOLTAGE	L1-L2	_____	L2-L3	_____	L3-L1	_____
COMPRESSOR AMPS	L1	_____	L2	_____	L3	_____
COMPRESSOR AMPS	L1	_____	L2	_____	L3	_____
INDOOR-FAN AMPS	L1	_____	L2	_____	L3	_____

TEMPERATURES

OUTDOOR-AIR TEMPERATURE _____ DB

RETURN-AIR TEMPERATURE _____ DB _____ WB

COOLING SUPPLY AIR _____ DB

GAS HEAT SUPPLY AIR _____ DB

PRESSURES

GAS INLET PRESSURE _____ IN. WG

GAS MANIFOLD PRESSURE _____ IN. WG (HI FIRE)

REFRIGERANT SUCTION _____ PSIG — CIRCUIT NO. 1 _____ PSIG — CIRCUIT NO. 2

REFRIGERANT DISCHARGE _____ PSIG — CIRCUIT NO. 1 _____ PSIG — CIRCUIT NO. 2

☐ VERIFY REFRIGERANT CHARGE USING CHARGING TABLES

☐ VERIFY THAT 3-PHASE SCROLL COMPRESSOR ROTATING IN CORRECT DIRECTION (48TJ014 ONLY)

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE

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